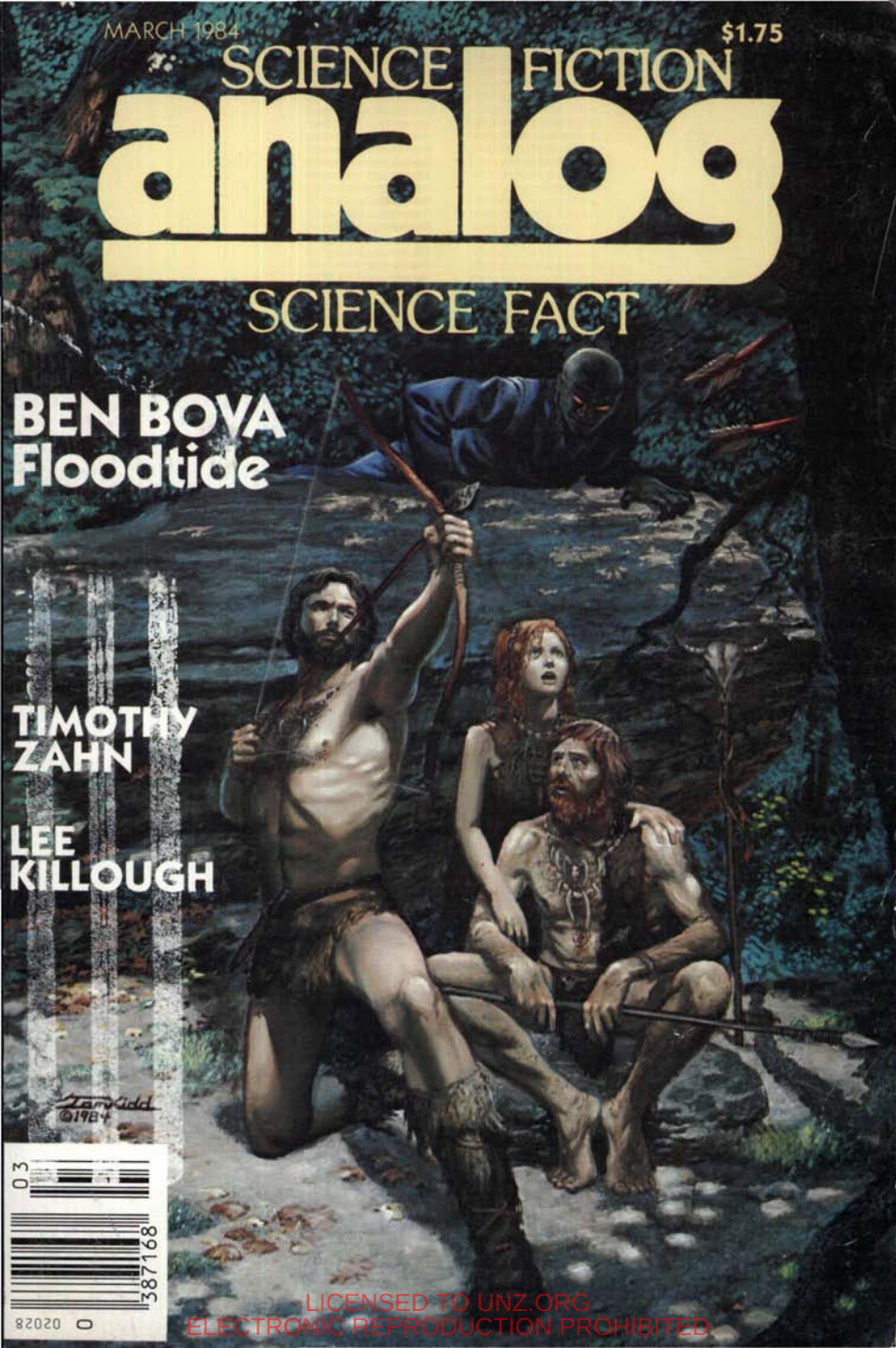

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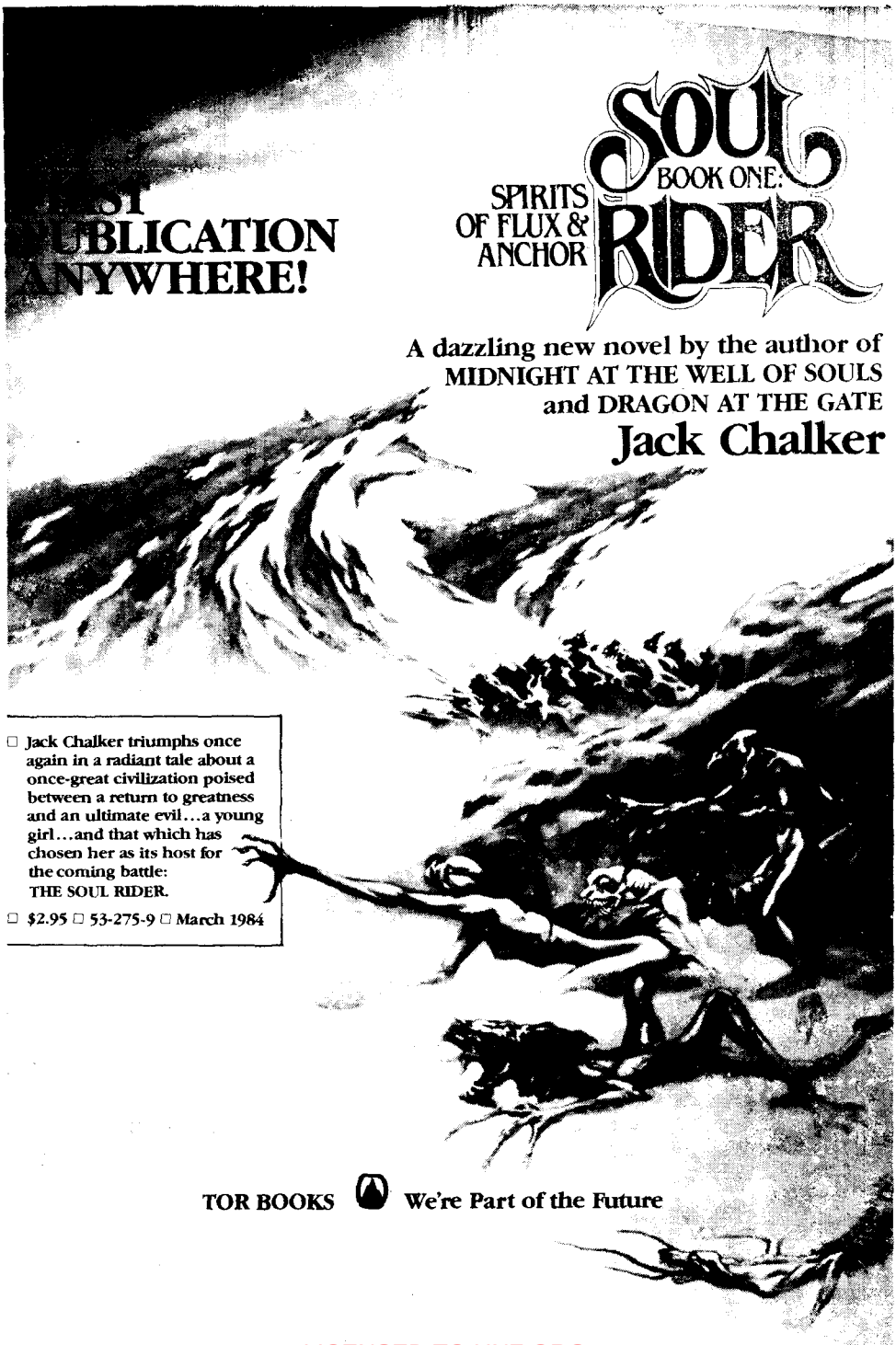
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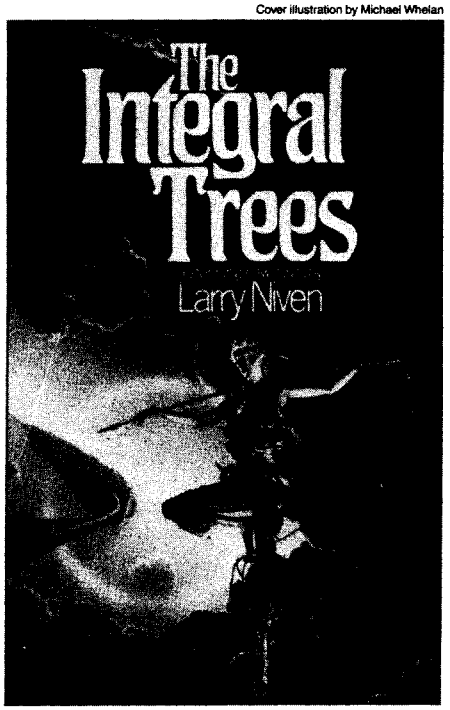

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Editorial

NOISE

Stanley Schmidt

Is "progress" real?

Some years ago one of my best teachers annoyed me by posing that question, in regard to scientific understanding, with more seriousness than I thought it deserved. The most irritating part of it was that, since I had a high regard for his general wit and wisdom, I could not dismiss his seemingly out-of-character question as lightly as I wanted to. I had to *think* about it.

As I recall the context and subsequent discussion, the question of whether our species has really made any progress over the centuries originally referred to something like this. In just about any given field, our ancestors have gone through a series of quite different beliefs about How Things Are, each based on varying amounts of inherited dogma and more or less recent observations. It was once believed, for example, that the Earth was stationary, the Sun revolved around it, and the stars were fixed to a crystal sphere a rather modest distance out. Later the Earth was viewed as revolving around a fixed sun. Still later the Sun itself was considered to be in motion among stars spread through a large volume of three-dimensional space. Estimates of just how large a volume, and just what the stars *are* and how they work, have gone through several radical changes. The holders of each of these views of the universe have assumed that their version was better than any of its predecessors. Yet all but the latest have been discarded as wrong. How can we know that our current beliefs are in any real sense superior to all those on the scrap heap, and will not soon join the rejects?

Even though I initially found it highly distasteful, the best answer I could come up with is that we *can't* assume that our current answers, in astronomy or any other field, are final answers in the sense of being completely accurate representations of the True Nature of External Reality. Observing the historical pattern—strong confidence in a theory fol-

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lowed by its rejection—leads me to suspect that much of what we now believe *will* ultimately be discarded as more or less incorrect. After all, those who clung to earlier efforts were no less confident that *they* finally had The Answers, and proof to back them up. We think we know better and have stronger evidence, but so did they.

However, I also concluded that there is at least one sense in which science actually has made demonstrable progress. It depends on the concept of a *model*—a theoretical construct with enough resemblance to the actual universe that it can be used to make accurate predictions. It doesn't have to be *right;* nobody still believes the Bohr model is anything like a real hydrogen atom, but it is still useful for certain kinds of calculations. Each of those views of the universe is such a model and each is somewhat useful, but the later ones are "better" because they can predict more things more accurately. It may be that none of them, including those currently in vogue, matches very closely the actual structure of the universe. But the choice is not as simple as "absolutely right" versus "absolutely wrong." Any model which can predict anything accurately has value, and if history has produced successively more accurate and versatile models, those "improved" models are genuine improvements because they are more useful. Newtonian mechanics was a big improvement over earlier physics because it could do more that was confirmed by experiment, even though improving it still more to cover new data required a radically new model of the universe. Improving on *that* model, which we associate with relativity, may well require an equally drastic change. And there's no guarantee that even *that* will be the Last Word.

That seems to be the situation with *scientific* progress: we still don't know Ultimate Truth, or even whether we're on the right path toward it, but we *can* identify real improvements in utility. How about other kinds of progress? *Technological* progress is possibly the easiest; a "utility" test is even more clear-cut here than with science. If technological progress means being able to do more things more efficiently, we're surrounded by evidence that would be very hard to deny. The average American on an average day routinely does dozens of things which his ancestors, from antiquity almost to the present, would have considered nothing less than magic.

Medicine is a special case, a peculiar hybrid of science, technology, and art, and a little trickier to judge. Good doctors now routinely cure a lot of things they couldn't before—but some diseases are more prevalent than before, many treatments are chancy enough to leave room for doubt as to what works and why, and as a result some treatments follow oddly oscillatory fashions and success rates remain pretty low.

Social progress is a *lot* trickier to evaluate. It might be possible to get a good many people to agree that a "utility" criterion would be appropriate here, too; that is, that social systems should be judged by how well they serve the physical and psychological needs of the people living under them. Getting

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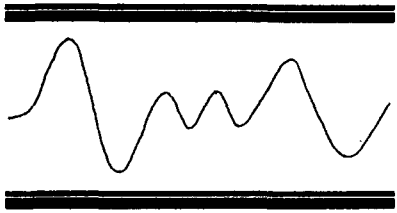
people to agree on exactly what that *means*—on what sorts of things *are* good or bad for people—is a whole lot harder. This is partly because human welfare depends on so many variables, many of them highly subjective and interacting in complicated ways, and partly because of another effect which I can best explain by analogy with communication technologies.

Any telephone engineer or ham radio operator is all too familiar with the concept of signal-to-noise ratio. "Signal" is the information you want to send from here to there; it might be, for example, a voltage which varies with time like this:



This signal, which might be produced by a microphone which generates a voltage proportional to the air pressure in front of a singer, is fed to some sort of a transmitter, processed in ways whose details don't matter for present purposes, and carried by currents in wires or electromagnetic waves in space to a receiver which reconstructs the original signal. The trouble is that everything along the way—transmitter, wires, atmosphere, receiver—adds unwanted signal components called "noise" (commonly caused by things like lightning and random motions of electrons in wires). So what comes out of the receiver might look more like

which looks like the original signal confused by more or less random oscillations around what it "should" be.

An important part of the engineer's job is to minimize the amount of noise that gets superimposed on the signal in the first place. Failing that, he must find ways to *remove* noise from the final signal. But how does he know what part of the polluted signal to remove? When he sees a mixture of signal and noise, and the whole object of the exercise is to *find out* the form of the signal, how can he recognize and eliminate that-which-is-not-signal? In some cases he can use fairly simple means; in the example, he might know that most of the noise will be at higher frequencies than the signal, so a low-pass filter can take much of it out without undue distortion of the signal. A more sophisticated method called "signal averaging" uses the random nature of much noise. Under suitable conditions, if a computer looks at several equal intervals of time and averages the values of signal-plus-noise in all of them, noise (being random) will average out to approximately zero while the nonrandom signal remains. (For another homey but dramatic example of signal averaging, watch an 8-millimeter movie and then stop the projector to look at several individual frames. You'll probably be amazed at the very low quality of any frame, but when you run

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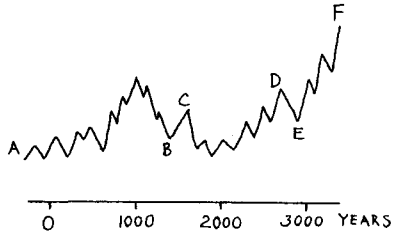
them by at 16 or 18 per second, your eyes and brain average out the grain and specks and scratches which vary randomly from frame to frame and all you see is a surprisingly decent picture.)

Now for the historical analog. Suppose those two graphs represent not electrical signals, but any variable measuring some aspect of social well-being. Such variables are hard to define in generally applicable ways, but one example might be "well-fedness," measured in such units as caloric intake per person per day. The smooth "signal" might represent fairly long-term trends, for example, plotting data based on weekly averages, while the "noise" represents daily fluctuations, most of them minor, normal, and unimportant. Signal averaging might not always be the best noise-removal method, since history is not truly cyclic (or is it?), but the important point is that major trends—the ones of real historic significance—in such graphs will practically always have "noise" superimposed on them. And since *really* major trends may involve time scales of hundreds or thousands of years, noise fluctuations, trivial in long-range historical terms, may involve periods comparable to human lifetimes—and therefore be the dominant features in an individual's view of history.

Look at this one, for example:



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The vertical variable might be real income or life expectancy or any other measure of a civilization's success. I haven't tried to show the actual history of any particular variable, but I have chosen the time scale and the general shape of the curve to bear at least a qualitative resemblance to several real human trends. Looking at the graph from the comfort of your armchair, you can see that there has been very real net progress in the 3,000-plus years between points A and F, even though that progress has not been fast or smooth. You can also point sagely to a long Dark Age and a Renaissance that built a lot of upward momentum. But if you did not have the graph and you lived your whole life on the historically brief upslope between B and C—as you very well could, since it lasts 200 years—you could easily develop a strong but false optimism that the worst was over and humanity's future held nothing but brightness. Similarly, if you lived between D and E, you could easily get the false impression that you were witnessing the final fall of civilization. If you've never personally seen anything but decline and decay, why should you believe, deep down, that anything else really ever happened or will happen?

True, you can (if you're lucky) study history and laboriously gain some sense of perspective—but very few people ever gain much, or at a very deep level. None of us ever sees ancient Rome or Carthage except at a great distance, through history-colored glasses. Few of us can *really* even picture our own grandparents as flesh-and-blood teenagers, much less grasp that hundreds of generations have lived through ups and

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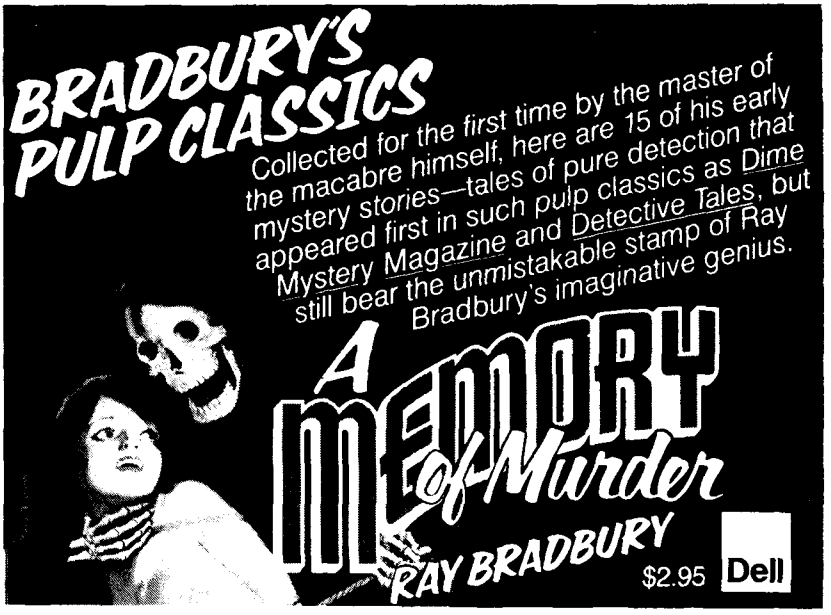
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downs not all that different from the ones that we see greatly magnified by proximity.

And it's most unlikely that historical progress will ever be free of noise. Nothing else in nature or technology is. Even the most refined control systems built by man—thermostats, for example—do not hold the variables they control absolutely steady, but rather watch the fluctuations which constantly occur and apply counterforces to bring them back when they wander too far one way or another. Societies do the same, but societies are very massive. Once started, they can drift quite a while before the need for correction is noticed, and even more before an attempted correction has a noticeable effect. That same inertia will quite likely produce an overshoot before the "corrective" adjustment ends. The pendulum analogy often applied to social change is more apt than some of its users realize. Both pendula and societies oscillate around equilibrium points because of the interplay of restoring forces and inertia. And since those oscillations, in societies, have periods comparable to individual lifetimes, individuals will continue to have trouble telling whether their cultures are really going forward or backward.

There is, of course, at least one other reason why it's hard to judge human progress while you're in the midst of it. It involves too many variables. While some rise, others fall; and it may not be obvious how they should be weighted to assess overall gain or loss. Quite likely the appropriate weighting factors, if such even exist, involve not simple numbers, but something like *vectors* in

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a many-dimensional space. Furthermore, even if a particular value of one variable is taken as a goal and that goal is achieved, it will still take a lot longer to judge whether the achievement was really beneficial. As John Campbell once observed, "You can't do only one thing." Any action has side effects, and they must be included in evaluating results. Some people are quite sure that the increased personal freedoms gained by some groups during the '60s and '70s represent profound social progress; others are just as sure that they are evils which must now be stopped.

Personally, I'm not sure at all. I have my own preferences about what I'd *like* to believe, but I can't honestly say I *know* whether the net changes are positive or negative, because all the returns aren't in yet. To take one example (chosen to avoid singling out any of the usual "minorities"), increased acceptance of divorce has rescued many people who formerly would have been trapped in hopelessly miserable marriages. On the other hand, the availability of an easy out has reduced the incentive to put the required effort into saving others which *should* have been saved, and left a wide path littered with broken homes and pain and frustration. Was the local version of civilization, on the whole, better off before or after these changes? Lots of people, on both sides, claim to know; I'm willing to admit I don't. What has really been done here, and in many other cases, is a social *experiment*. While it's going on, the participants can't tell whether they're looking at real, significant progress, decay, or merely a bit of noise. Only time will tell—and chances are very good that when the outcome of the experiment is finally clear, the only real conclusion will be that still another, more refined experiment is needed to find a still better option.

That observation leads to one final question. Do people really *want* social progress? There has been a great deal of lamentation that social progress has lagged far behind scientific and technological—that while people explore space and transplant hearts, the human race as a whole remains afflicted with wars and hunger and corrupt politics. Much of the lamentation is even sincere, but tends to grow hushed when it's time to follow through—because there's a painful truth associated with any really significant social change. Everybody wants the *results* of everlasting peace and full bellies and honest government. But since the existing problems seem deeply rooted in existing ways of doing things—in customs and traditions and attitudes—it must follow that solving them, which will by definition be a profound, fundamental change, will necessarily involve profound, fundamental changes in the ways people live and think and interact.

And how many people do you know who *really* want *that?* ■

● Fanaticism consists in redoubling your efforts when you have forgotten your aim.

George Santayana

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1

My eyes opened and showed me a blue sky, bright with sunshine and puffy white clouds.

It took me a moment to remember. I am Orion, the Hunter. I seek Ahriman, the enemy of all humankind, the gray-skinned one who seeks to destroy the very foundations of the continuum, the murderer who killed the woman I love, thousands of years in the future.

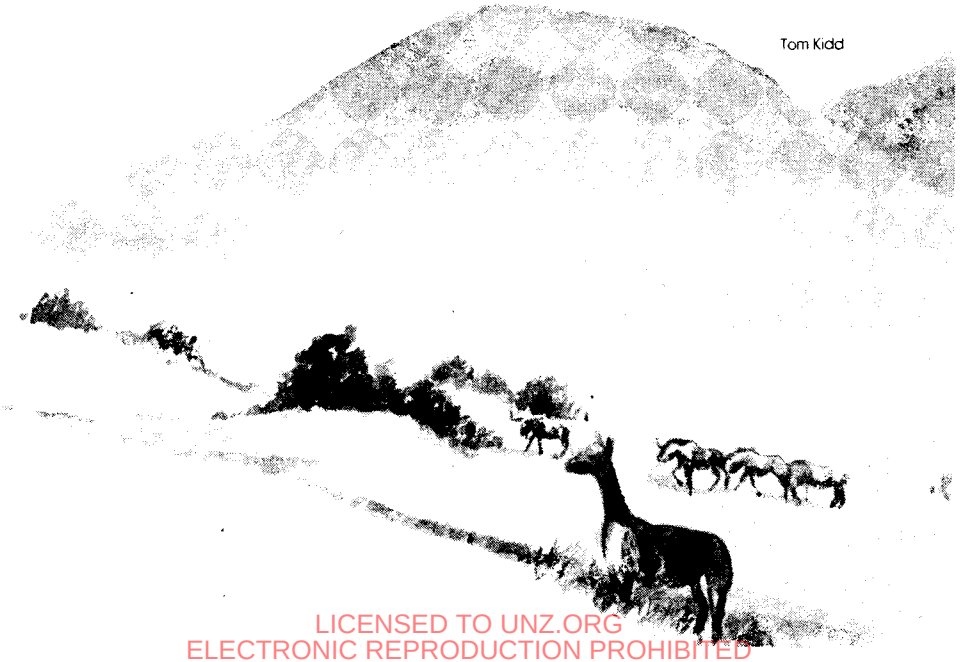
I serve Ormazd, the Golden One, the godlike being who fights Ahriman through me. Ormazd, who can whisk me from one point in spacetime to another, who watches the struggle from afar. Ormazd, who cares nothing for my pain or fear or love, who has taken me through death twice now so that I can continue the hunt for Ahriman.

I realized that I was lying on my back. Sitting up, I surveyed my new location. It was a broad open meadow of cool grass that sloped gently down toward

Ben Bova

FLOODTIDE

He was a pawn, fighting
a single battle in
a struggle whose scope he could only begin
to grasp. But he understood that there are better ways to
long-term victory than mere brute force. . . .



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a distant river. Trees grew at the water's edge, the first trees I had seen in a lifetime. The grass itself was long and wild and matted; no blade had ever cut it, from the looks of it. Wildflowers dotted the land with color, Rocks and boulders jutted here and there; no one had ever cleared them away. The trees by the river swayed in a warm wind, rising up from a tangle of low foliage that hugged the river's bank. There was no sign of civilization, no sign of human beings ever having been here.

A rabbit's brown, lop-eared head popped up from the grass. It eyed me, nose twitching, as I sat there, then hopped up closer, well within arm's reach. It had no fear of me at all. After a few moments of inspection, it bounded away and disappeared into the long grass once again.

I looked down at myself. My garments were a simple kilt made of hide and a leather vest. A braided belt around my waist held a small knife. I drew it from the belt and saw that it was made of a smooth stone handle and a blade of chipped flint, tied to the handle rather clumsily with what looked like dried pieces of vine.

Closing my eyes for a moment, I tried to puzzle out where and when I might be. Obviously I had been sent backward through time again. Ahriman had told me I was moving back toward The War, from the twentieth century to the thirteenth to the . . .

I looked down at the crude knife in my hand once more. I was in the Stone Age, apparently. Ormazd had flung me backward not mere centuries, this time. I had travelled back ten thousand years or more to a calm grassy meadow on a sweet sunlit morning. An Eden where humans were so rare that animals did not fear them. Civilization had not yet begun. Not even the first villages had been started. The pyramids of Egypt were a hundred centuries or more in the future. Glacial ice sheets still covered much of Europe, retreating grudgingly as the Ice Age gave way to a warmer climate.

Here it was springtime. Flowers bloomed everywhere. Insects buzzed and scurried through the grass. Birds swooped and sang overhead. I must be far south of the ice, I reasoned, or in a region where the glaciers had never penetrated.

I got to my feet. It was a beautiful part of the world, serene and untouched by human hands. Yet I knew that if Ormazd had sent me here, it was because there were humans in this time and place. And Ahriman. He would be here, too. Somehow, this spot was a nexus in the spacetime continuum, a pivotal location where Ahriman planned to change the course of events. My task was to stop him, at all costs, and kill him if I could.

At all costs. I could feel my face harden into a grimace of anger and frustration. What did death mean to one such as Ahriman? Or to me? Pain, the shock of separation, the grief of loss. But all that was temporary. A moment, an eyeblink later, and centuries or millennia had melted away and we still lived, still existed, only to begin the cycle anew: hunter and hunted, prey and predator, kill and be killed. Must it go on forever, endlessly? Was there no peace in all of spacetime? Was there no

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place for me to rest and live like a normal man?

You are Orion, a voice within my mind spoke to me. Orion, the Hunter. Your task is to find Ahriman and kill him. Through all the eons of time, if need be, you must seek out the Dark One and destroy him before he succeeds in destroying all humankind. For this purpose you were created. Ask nothing more.

I knew it was Ormazd's command, and I had no choice but to obey it. I knew that asking for something more, for rest or love or simply oblivion and an end to all existence—Ormazd would never grant me that. I knew that I would do his bidding because I had no real choice. But I did not have to like it. Nothing that Ormazd could do to me could make me serve him happily, willingly. I did what I did out of necessity, out of a sense of duty to my fellow human beings. But not out of love, or even respect, for the self-styled God of Light.

I walked to the river. It was pleasant, at first, strolling easily under the warm morning sun. The going was more difficult along the river's bank; the brush grew thick and tangled here. Thorns scratched at my bare arms and legs as I forced my way through. At last I stood at the water's edge, with the big trees swaying and sighing above me in the gentle breeze.

The river was slow and sluggish, meandering gently through the grassy plain. I knelt down and drank from its clear water. Off to my right I saw a row of stones rippling the water's surface, lined up roughly to form a path across the river. The first sign that human beings had been here: a ford.

I made my way across the river and began climbing the gentle slope that led up and away toward a line of low hills. As I reached the crest of the ridge line I saw that the land became more rugged, serrated into row after row of hills, each line rising slightly higher than the one before it. And off in the distance, floating like a disembodied ghost in the bluish haze, rose a strange double-peaked mountain. One of its cones was covered with snow at the top, but the snow was streaked with dark gray, and a thin wavering line of whitish smoke snaked upward and dissipated in the clean blue sky.

A slumbering volcano. Something about the mountain's double-peaked shape stirred a faint memory within me, but I couldn't pin down exactly what it was.

With a shake of my head, I turned to go back down the hill. The river-watered meadow looked better to me than these ridges.

That's when I saw them, coming over the ridge line about fifty yards to my right. Silhouetted against the bright springtime sky, a string of thirty-some people walked single file, heading in my direction.

They were slender, fair of skin, their hair reddish and wild and long. Their clothes were hides, like mine. They were caked with dirt and I could smell their sweat and grime on the breeze. A few mangy, bone-thin dogs accompanied them. They bared their fangs and snarled at me, but stayed near their masters.

The red-bearded man leading them carried a pole with the skull of a horned animal fixed to its top. He raised the

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pole and halted so abruptly that the children, back toward the end of the line, bumped into their elders and jostled them. I almost laughed—until I saw that all of the men, and several of the younger women, carried long, slim spears tipped with blackened, fire-hardened points. Even the pole carrying the group's totem was a spear.

For several moments the red-haired people did nothing but gape at me, their expressions ranging from puzzlement to curiosity to fear. Hands fingered stone knives. Several of them shifted their long knobby-shafted spears to their throwing hands. I saw that all the women were armed, at least with knives, and even the bigger children carried sticks or clubs. The dogs continued to growl menacingly.

A Stone-Age hunting clan, out of the dawn of human history. Shaggy-haired, unkempt, gaunt with the tautness of constant hunger, and as wary of a stranger as a bird is wary of a snake. Yet they were human, fully; just as human as I. Perhaps even more so.

The red-bearded leader's upraised arm still hung poised in the air as he looked me over very carefully. A young woman stepped up beside him. My heart leaped inside my chest. She was red-headed, just like the rest of them, and matted with filth. But even from this distance I could see she was the gray-eyed woman I had known in other eras; the woman I had loved, thousands of years in the future of this world. The woman who had loved me.

She showed no sign of recognizing me, though. I saw her lips move as she spoke to the leader, but her tones were too low for me to hear her words.

The leader silenced the dogs with a gesture, then turned and gestured to two of the younger men, further down the line. They glanced at each other in the classic *Why me?* expression, but they started walking slowly, reluctantly, along the grassy slope toward me, hefting their long spears as they approached. The rest of the clan gathered around their leader in a ragged semicircle, ready to charge at me or run away, back over the crest of the ridge, depending on what hap pened next.

The pair approaching me were teenagers, the Stone-Age equivalent of cannon fodder. They were beardless, but their coppery hair was shoulder-long and matted. I could almost see the vermin living in it. Every muscle and tendon in their arms and torsos was rigid with tension. Their knuckles were white as they gripped their spears and held them pointed at me. They were too skinny, hollow-cheeked, and young to look truly fierce, but they lacked nothing in grim determination.

I raised both my hands, palms outward, in what I hoped they would understand as a sign of peace. At least they could see that I held no weapons. They halted a good ten yards from me. Close enough to drive a spear clean through me, if I were slow enough to allow that to happen.

"Who are you?" asked the one on the left, in a quavering, cracking adolescent's voice.

I wasn't surprised that I understood their language. Ormazd had programmed it into me, no doubt, just as he had programmed uncommon strength and speed of reflexes into my body. I am not superhuman, of course, but my

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powers are considerably greater than a normal man's—although nowhere nearly as great as the enormous power of Ahriman, my prey.

"I am a traveler, from afar," I replied.

"What are you doing here?" asked the other one. His voice was a bit deeper, but equally shaky. He raised his spear as he spoke, ready to throw it at me.

I kept my hands outstretched from my body. I knew that I could snap both their spears, and their bones, any time I chose to. But I doubted that I could handle the whole clan if they decided to rush me all at once.

"I come from far away," I said, loud enough for their leader to hear me. "I have traveled a long, long time." No lie, I told myself. "I am a stranger in your land and seek your help and protection."

"Traveled?" asked the second one. "Alone? You travel alone?"

"Yes."

He shook his head vehemently. "You lie! No one can travel alone. The beasts would kill you, or the spirits of the dead. No man walks by himself, without a clan."

"I speak the truth," I said. "I have traveled a great distance, alone."

"You belong to another clan. They are hiding nearby, waiting to ambush us."

So there was warfare here. Killing. I felt a great sadness wash over me. Even in this young Eden, human beings murdered one another. But I looked past the two frightened, suspicious youths at the young woman standing by the

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leader's side. Her eyes met mine. They were as gray and deep as those eyes I knew so well. Yet there was no spark of recognition in them, no hint of understanding. She was a woman of her time, a Stone-Age huntress, as savage and uncouth as the rest of them.

"I am alone," I repeated. "I have no clan. That is why I want to join you. I am weary of being alone. I seek your friendship."

They glanced back over their shoulders at their leader, then turned back to me.

"You cannot be of the Goat Clan," said the deeper-voiced one. "Who is your mother? Who is your father? They are not of the Goat Clan. *You* are not of the Goat Clan."

It was all very simple, in their minds. Either you were born into the clan or you were an outsider, a threat, a danger. Perhaps you could marry into the clan, but more likely a male took his bride to his own clan. Women could be traded back and forth, but not men, I was willing to bet. And the horned skull on the leader's pole had been a goat. I smiled to myself: a good totem. The goat is a hardy animal, willing to eat almost anything and as tough as the flint these people used for tools and weapons.

"It is true that I am not of your clan. I have no clan. I would like to stay with you. It is not good for a man to be alone."

They wavered, uncertain, and looked back at the leader again. He was scratching his red beard, frowning in concentration. He had never encountered a problem like this before.

"I can help you," I coaxed. "I am a good hunter. My name is Orion. It means Hunter."

Their jaws fell. All of them. Not merely the two youths, but the leader and the rest of the clan gaped at me. Even the dogs seemed to become more alert.

"Yes," I said. "Orion means Hunter. What are your names? What do they mean?"

Both the lads started yelling and brandishing their spears at me. Their pupils were dilated with rage and fear, sweat broke out on their bodies, the veins in their necks began to throb furiously.

Beyond them, the whole clan surged and roared. Without a visible signal from the leader they hefted their weapons and swarmed down the slope toward me, dogs and all. The two teenagers were jabbing their spears at me, working up the courage to make a real attack.

I made a very quick, very human decision. I turned and ran. I had no desire to frighten them further, or to risk being swarmed over and hacked to bloody pieces by their primitive weapons. So I ran, as fast as I could.

They threw spears at me, but I easily avoided them. There was no organized pattern to their fusilade; over my shoulder I could see the individual shafts wobbling across the sky so slowly that I could have turned and caught them if I had wanted to. Instead I simply dodged as I ran.

They chased after me, but their speed and endurance were nowhere near mine. Not even the dogs could keep up with me. Besides, they were merely trying to chase me away; you always run better when your goal is to save your own skin. In less than a minute I was beyond the range of their spears. Their leader sent

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a relay of four men after me, but their endurance was pitifully short. I jogged down toward the river, crashed through the underbrush, and dived into the cold water with a huge, splash.

I swam to the other side and crawled up into the foliage along the bank. My erstwhile pursuers stopped on their side of the river, pointing in my general direction, yelling and shouting angrily, but never so much as dipping a toe into the turgidly flowing water. The dogs yapped, but stayed close to the men.

After a while they turned away and headed back toward the rest of the clan. I crawled out of the brush and stretched myself on the grass to let the afternoon sun dry me.

2

By nightfall I had reasoned out what had upset them so badly. Names. Primitive tribes are naturally wary of strangers, and in a landscape as thinly populated with humans as this one, strangers must be extremely scarce. Primitives are also very superstitious about names. Even when I had been among the Mongols, at the height of their empire, no one willingly spoke the name of Timujin, Genghis Khan.

To these Stone-Age hunters, a person's name carried his soul and strength with it. To give your name to a stranger is to expose yourself needlessly, inviting witchcraft and danger, like voluntarily giving your fingernail clippings or strands of hair to a voodoo priestess.

Thinking back on the afternoon's encounter, I could see that I had shocked them when I voluntarily told them not only my name, but its true meaning. And when I asked them for their names,

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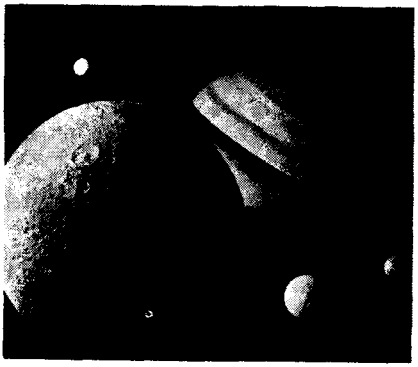

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they attacked me. Obviously they thought me a demon or a warlock. I had terrified them and made them triply afraid of me.

As the sun set behind the row of rocky hills across the river, and the sky flamed into achingly beautiful reds and purples, I picked out a mossy spot next to a tree for my night's sleep. I usually need only an hour or two of rest, but I felt physically weary and even more spent mentally.

Then the distant roar of a hunting lion echoed through the darkening evening. Reluctantly, I got up from the soft moss and climbed the tree. A pair of squirrels chittered at me angrily, then scampered back into their hole. I found a sturdy notch and settled into it. The bark was rough and hard, but I fell asleep almost immediately, thinking of the gray-eyed woman.

But it was Ormazd who came to me in my sleep.

It was not a dream; it was a purposeful communication. I saw him shining against the darkness of night, his golden hair glowing with light, his face smiling yet somehow neither happy nor pleased.

"You have found the tribe." It was neither a question nor an acknowledgment of success; merely a statement of fact. His robes were golden, glowing. He was seated, but on what I could not see.

"Yes, I found them," I reported. "But I frightened them and they chased me away."

"You will gain their trust. You must."

"Yes," I said. "But why? What is so important about a gaggle of primitives?"

Ormazd looked as splendid as a Greek god, radiant against the darkness. But as I studied his face more closely, I saw that he was a troubled god, weary of struggle and pointless questions from mere mortals.

"The Dark One seeks to destroy this . . . gaggle of primitives, as you call them. You must counter him."

I wanted to say no, I wanted to tell him that I would refuse to do his bidding unless he gave me the woman I loved, unharmed and safe from the wrenching separations of this endless quest through time. The thought was in my mind, the demand was on my lips.

But instead, I heard myself asking meekly, "What does Ahriman stand to gain from killing a small clan of Stone-Age hunters? How would that affect human history?"

Ormazd eyed me disdainfully. "What matter is that to you? Your appointed task is to kill Ahriman. You have failed in that task twice, although you have managed to thwart his schemes. Now he is stalking this clan of primitives, therefore you will use the clan as bait to stalk him. What could be simpler?"

"But why me?" I pleaded. "Why have I been taken from my own time to hunt down Ahriman? I haven't the strength to kill him, you must know that! Why can't you deal with him yourself? Why must I die when I don't even understand . . ."

"You do *not* understand!" Ormazd's voice was suddenly thunder, and the brightness radiating from him became too painful to look at directly. "You are the chosen instrument for the salvation of the human race. Ask no pointless questions, and do as you must."

I had to shield my eyes with my upraised hands, but I pressed on, "I

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have a right to know who I am and why I am being made to do this."

Ormazd's blazing eyes felt hotter than the nuclear fires that had killed me ten thousand years in the future.

"You doubt me?" he rumbled. It was not a question, it was a threat.

"I accept you. But that is different from understanding. I had a life of my own once, didn't I? If I must die . . ."

"You will die and be reborn as often as is necessary."

"No!"

"Yes. You must die to be reborn. There is no other way to step through time, not for you and your kind. For mortals there is no way to move across time except through death."

"But the woman—what of her?"

For many moments Ormazd was silent, his lips drawn into a tight line. Then he spoke again, more softly. "She is in danger from the Dark One. Ahriman seeks to destroy her, and me, and all of the continuum. If you wish to save her, you must kill Ahriman."

"Is it true that you, your race—" I hesitated, then plunged on—"that you annihilated Ahriman's race, all of his kind, except for him?"

"He told you that?"

"Yes."

"He is the Prince of Lies."

That was no answer, I realized. But it was all the answer I was going to get.

"When was The War?" I asked. "What happened?"

"That is something that you must discover for yourself," Ormazd replied, his image beginning to waver and fade before my eyes. Then he added, "And for me."

I was stunned. "Wait! Do you mean that you yourself don't know what happened? You don't know what took place in The War? What your race did to his?"

But he was only a pinpoint of light now, dwindling into the all-engulfing blackness. I heard his voice calling, from far away:

"Why do you believe that my race is not the same as yours, Orion? Are we not father and son?"

With a shock I realized that I was staring at the dark night sky. Twinkling stars gazed back at me from the depth of space as I clung to the tree's rough bark and searched the bowl of heaven for understanding, for meaning. I sought out the constellation of Orion, but it was nowhere in sight.

3

For days on end I trailed the Goat Clan as it marched across the Neolithic landscape. I had to get them to accept me, but they were totally xenophobic: either you were born a member of the clan or married a member of the clan—or you were an outsider, to be shunned.

But Ormazd's command was clear. I must save this clan from Ahriman's plan, whatever it might be; I must use this clan to trap the Dark One.

And the woman, the gray-eyed one whose beauty could not be hidden even by layers of grime and ignorance. I knew she was the one I had known at other times, in different eras. But she gave no hint of recognizing me. Was she reborn each time I was, but without any memories at all of her previous lives? Why would Ormazd do that?

I thought I knew the answer. She was my local barometer, as native to this time and place as any other member of

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her clan. If I could get her to accept me, the rest of the clan would.

And I wanted her to accept me. I wanted her to love me, as she had loved me ten thousand years ago, as I have loved her through all time.

But they were a superstitious, fearful troop of savages whose prime instinct was to flee from the unknown—and to kill strangers.

I watched them from afar. They spent much of their days hunting, the younger women beating the bushes for rabbits, squirrels, and anything else they could find, while the men roamed farther afield looking for bigger game and generally finding none. The older women stayed by their campfire, tending the children and gathering edible plants and berries.

By dusk they were all gathered around their fire, the women cooking their meager meals, the men chipping new tools from stores of flint they carried in leather bags, or hardening their spear points in the flames. They were a self-contained, self-sufficient group, living off the land, staying just above the starvation level as long as they did not produce too many children.

Twentieth-century ecologists despaired of "modern" man's so-called throwaway culture, and pointed to primitive tribes who, they claimed, lived in harmony with nature. Here I was watching the origins of the throwaway culture. These Neolithic hunters walked to a campsite, cut down brush and stripped trees of their smaller limbs to build a fire, killed whatever game they could find, and tossed their bones away when they were finished gnawing on them. They left discarded flakes of flint,

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tools, and weapons that were no longer useful, wherever they dropped them.

The smoke from their fires did not damage the purity of the Neolithic air. Their scattered refuse piles did not contaminate the soil. Their pitiful little camps did not harm the water table, nor did their hunting endanger any animal species. But the attitudes of these simple nomadic hunters would become the ingrained attitudes of all the generations of humans that followed them. What was acceptable for a few scattered bands of primitive hunters became a massive environmental problem when those hunters' descendants began to number in the billions.

But despite myself I had to smile as I watched them, day after day, and thought of the absurd assumptions that twentieth-century ecological moralists made about primitive peoples.

This was not accomplishing my mission, however. After several days of observing them, mostly from hiding but now and then blatantly enough so that they could see me and know I was trailing them, I hit upon a scheme that would get them to accept me—I hoped.

I had boasted to them of my skill as a hunter. It had been mostly empty words; the only hunting I had ever done had been at the side of a Mongol emperor, in a ritualized killing drive. But I knew that my reflexes and senses were powerful enough to give me a great advantage over these savages in anything that required physical exertion and skill. After watching them stalking game and building their primitive snares, and usually failing to catch anything, I knew that I could improve on their methods.

So I began taking game from the

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countryside and leaving it at their smoldering campfire while they slept. Innocents that they were, they posted no guards as they slept out in the open. The fire protected them from dangerous night-stalking beasts, and other human tribes must have been too far away to pose a threat to them. It was easy for me to leave a rabbit or two, or a brace of fowl that I had flushed out of the brush and killed by throwing small rocks at them.

I expected their dogs to be a problem, so I took the precaution of bringing extra meat for them. Within two nights the dogs had accepted me as a welcomed friend, and stayed quiet enough so that I could slip into the camp without awakening the people.

It took me several tries, but eventually I fashioned a crude bow and learned how to make arrows that would fly halfway accurately. I brought down a young doe with my new weapon, although I had to finish the job with my knife. I left the catch at their campfire just before dawn.

I watched them each morning, from a distance and always from concealment behind rocks or bushes. They were startled at first, wondering how the dead game appeared in their midst. They discussed it for hours at a time, some members of the clan apparently believing that others had done the deed. But no one admitted to it, and after a few mornings of finding the gifts by their campfire, they began to realize that it was the work of an outsider.

That made them fearful, even though they ate the offered gifts just as though they had caught it themselves. But they started to post sentries through the night. At first they were drowsing youths, and I managed to slip past them easily enough. Then a few of the adult men stood guard, but it was a rare night when they stayed alert enough to prevent me from leaving a gift near the smoldering campfire.

Gradually, I began to let them see me, but always at a distance. I would hold a fowl in my upraised hand or carry a young buck across my shoulders. They would huddle together and stare at me in awe. In the dark of night I would sneak in close enough to their crackling fire to listen to their talk, and before morning streaked the sky I would leave the prize that they had seen me with the previous day.

Soon enough they turned me into a legend. Orion was eleven feet tall. His eyes darted flame. He could leap across rivers and stop spears in midair merely by glancing at them with his fierce countenance. He was a mighty hunter who could bring down a mastodon single-handedly.

Their talk of mastodons intrigued me. Apparently the clans came together, later in the year, and hunted down truly big game together. The elders (who may have been all of thirty-five years, or even forty) told tales of grand hunts where they chased entire herds of mighty tusked behemoths over the edge of a cliff and then feasted on their carcasses to bursting.

I listened also to the names they called themselves, and learned that the red-bearded leader was Dal and the teenager with the cracking voice was Kralo. The woman I had loved in other times was known as Ava—and she was Dal's woman, I soon realized. That

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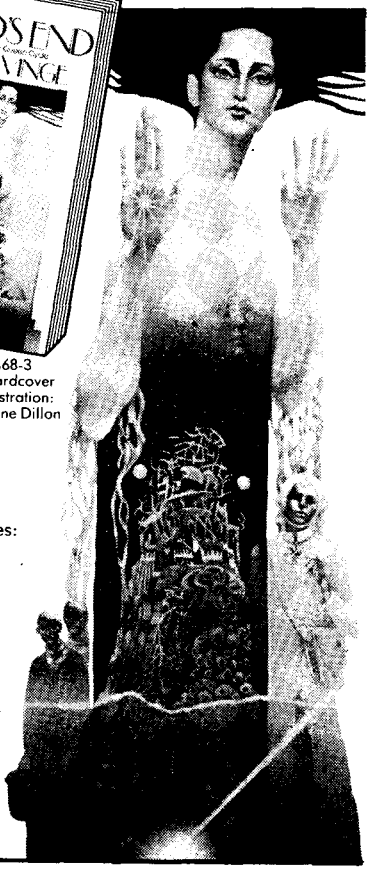

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hurt. For days I wandered away from the clan, feeling alone and betrayed by a woman who had none of the memories I had, whose only sight of me had been that first day when I had surprised and terrified the entire clan. What did you expect? I raged at myself. These savages don't have the time or the resources to allow women to go unmated. Did you think she would wait for your arrival? She didn't even know you existed until a few weeks ago. Even now she thinks you are a demon or a god, not a man who loves her and wants to possess her.

Still I moped and sulked, filled with self-pity and a smoldering anger at Ormazd, who could put me into this situation without a thought about my feelings.

After three days away from them, nursing my aching heart, I realized that I was not doing myself or them any good. I decided to return to the task that had been set before me. In truth, there was nothing else that I could do. I was a pawn in Ormazd's game, and the emotions of a pawn are not important to the chess master.

I sneaked back to their camp that night and listened to them asking themselves why the mighty Orion had abandoned them. What had they done to offend the great hunter? It took all my self-control to keep from laughing. How quickly the miraculous becomes commonplace! The gifts of food that had frightened them, at first, they now considered quite normal. It was the *absence* of the formerly wonderful that troubled them.

I decided to give them a real gift. First I thought back to the marches they made each day, the distances between one night's camp and the next. They were obviously moving through this springtime with a definite objective in mind. I calculated where they would camp two days hence, and made for that spot.

To my pleasure, I saw that the area had obviously been used as a campsite before: beside a shallow, swiftly gurgling brook was a patch of earth already blackened by the fires of countless earlier camps, and a mound of weathered bones where the hunters had tossed their garbage.

I spent that night and all the next day *really* hunting. With my rickety bow and a sling I had devised for throwing rocks, I amassed a huge pile of slain meat for the clan: rabbits, birds, deer, even a succulent young boar. I left the food at the intended campsite, spending almost as much time defending the cache against wild dogs and other scavengers as I did in hunting down more game.

The dogs were my biggest difficulty. These were not the half-tamed companions of the humans; they were more like wolves than pets. They were ferocious and intelligent. They hunted in packs, and they would have dragged me down and killed me if I had not been fast enough and smart enough to outwit them. I hated to do it, but I had to kill several of them before they finally gave up on my hoard and left the area.

I guarded the cache of meat through that long night and most of the following day. Finally, as the late afternoon shadows lengthened toward sunset, I saw the vanguard of the clan approaching from over the grassy horizon—two of the teenagers whom Dal often sent out

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ahead of the rest. I splashed across the rushing brook and hid in the foliage on its other side.

The boys saw the pile of game first and began leaping into the air and yelling madly. The rest of the clan hurried toward them, gaped, and then ran for the campsite. They were ecstatic. Never had they seen so much food in one place before. They gathered around the cache, swishing their hands through the air to shoo off the flies, and simply stared in awe at the pile of meat.

From my hiding place in the bushes I heard their leader, Dal, say gravely, "Only Orion could have done this."

"Can it be all for us?" Ava asked.

"We are his people," replied Dal. "This has been our clan's camp since before even old Makar can remember. It is Orion's gift to us. He has returned to his people. He is no longer angry at us."

I let them build their fire and settle down to feasting as the evening slowly pulled its violet blanket over the cloudless sky. I slipped away, went upwind along the bank of the stream, and where it eddied into a wide pool I saw a fine solitary stag dipping his antlered head to drink.

Unlimbering my bow, I slowly walked toward the stag. It saw me, but it was so unused to humans that it allowed me to get within deadly range of it. I felled it with a single shot through the neck, then slit its throat swiftly and cleanly with my stone knife. I felt a twinge of conscience, the memory of a later century when human hunters stalked such beautiful animals for sport, not for food. With a determined shake of my head, I lifted the carcass onto my shoulders and headed back toward the clan's camp. It was heavy, and I walked slowly, carefully, through the gathering dusk.

Just as the first star showed itself in the dark sky, I stepped into the flickering light of the clan's camp with the stag across my shoulders. They were still eating, stuffing themselves as only people accustomed to long hunger can do, their fingers and faces greasy with meat, the campfire blazing hot and shining in their eyes.

I stepped into their midst and dropped the stag with a heavy thunk at Dal's feet.

No one spoke a syllable. For several moments the only sound was the hissing of spitted meat burning on the fire.

"It is me," I said at last. "Orion. I bring you another gift."

They were victims of their own propaganda. They had puffed up their stories about me so far out of proportion that now they seemed terrified of my presence. None of them moved. Their faces were rigid with fear and surprise. They probably expected me to strike them with lightning, or something equally drastic, I suppose.

Ava recovered her wits before any of the others. Rising slowly to her feet, she extended both her arms toward me.

"We thank you, oh mighty Orion. What can we do to show our gratitude?"

She was filthy, her face and hands stained with the bloody, charred meat she had been eating. But in the firelight I saw the calm gray eyes that I had known and loved in other eras, and it took all my self-control not to clasp her in my arms.

I took a slow, calming breath and

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tried to speak in the somber manner they would expect of a demigod.

"I grow weary of solitude," I said. "I wish to be among you for a while."

That sent a murmur through them. Dal got to his feet and stood slightly behind Ava.

"I will teach the ways of hunting that I use. I will show you how to catch more game than you ever thought possible.

They remained unmoving, Dal and Ava standing, facing me, the rest of them still sitting in a semicircle around the crackling, hissing fire. I could see the conflict warring in their grimy faces. They were scared half out of their wits by me. Yet, to be able to hunt down animals like that! It was a tempting offer. Which would it be, their fear or their bellies?

Ava stepped closer to me and studied my face in the dancing firelight. I suppose I was none too clean myself, shaggy and unkempt.

"Are you a man or a spirit?" she asked boldly.

She was as beautiful as I remembered her. Tall and slender, almost my own height, taller than most of the men of the clan. Yet her strong, lithe body was completely female; the skins she wore could not hide that. Her bare arms and legs were dirty, scratched here and there. A scab covered one knee. Her matted filthy hair was reddish, like the others, instead of the darker tones I remembered. But she was the same woman, beautiful, intelligent, courageous, the one I loved.

I made myself smile. "A man," I answered. "I am only a man."

Dal moved from behind Ava to examine me more closely. There were no weapons in his hands, but he was clearly being protective of her.

"You look like a man," he said. "Yet . . ."

"I *am* a man."

"But you do things that no man can do."

"I will teach you how to do them."

Ava asked, "What clan were you born to, if you are a man?"

"My clan lives far from here. I have traveled for a long, long time."

"Can everyone in your clan hunt the way you do?"

"Some can," I said. "Some hunt better than I."

For the first time, a smile curled her lips. "They must be very fat, then."

I laughed. "Some of them are."

"Why are you alone?" Dal asked, still suspicious. "Why have you come to us?"

"My clan is far away, and I have been separated from it for a long time. I was sent here to help you, to show you how to hunt and to protect you from your enemies. I have been alone for more days than any of you can count, and I am weary of loneliness. You are the clan that I have sought. You are the people I wish to be with."

As I spoke the words, I realized the truth that lay in them. I have been alone all my life, as much of it as I can remember, except for the brief months when I loved this woman Ava in her other incarnations.

"It is not good for a man to be alone," said Ava, with surprising warmth and understanding in her voice. "Even the mightiest hunter needs a clan and a family."

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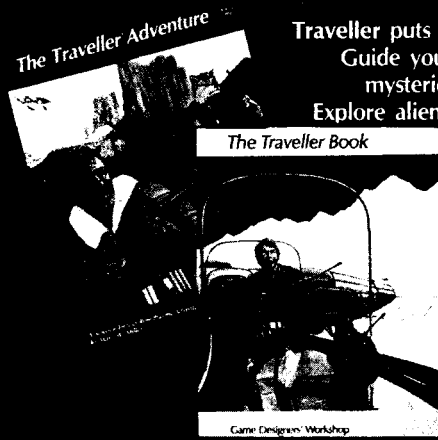

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Like all humans facing a difficult decision, they finally settled on a compromise. Dal spoke earnestly with the two elders of the clan, then with all the adults, male and female. They agreed to let me join them and show them my tricks of hunting. But they insisted that I had to sleep by myself, away from their campfire. Many of them were not convinced that I was not some form of a supernatural being, and they wanted to take as few chances with me as possible.

I accepted their decision. I had to. No one brought up the question of what to do about me *after* I had shown them all my techniques of hunting. These people did not think much about their future; they lived in the present, like all animals, and only dimly perceived that tomorrow might be different from yesterday.

I was content with their decision, for the time being. It fulfilled Ormazd's command. And it brought me nearer to Ava.

4

Dal and Ava stayed close to me at all times as the clan continued its migration across the green, flowering land.

Dal was a good leader, who took his responsibilities seriously. Nearly as tall as I, although much slimmer, he was well-muscled and had keen alert eyes. He watched me carefully every minute of the day. Dal had no fear that I might be a spirit who posed a supernatural threat to the clan. His worries were very practical and matter-of-fact. He feared that I might be a spy from another clan, an infiltrator who would somehow lead the clan into an ambush.

At first I didn't realize this. But after a few days of his suspicious, wary watch over me, I began to piece it together. At night, when the elders told their tales around the campfire, I heard enough singing over blood and battle to realize that even in this demi-Eden, where human clans were so thinly spread that contact between them was rare, war and killing were still common enough, and still glorified.

Apparently they met other clans on these migration routes, and when they did they generally battled over control of the hunting grounds. Although to me it seemed that the territory was teeming with game, to these nomadic hunters territorial rights were vital to survival. It took many square miles of ground to provide enough game to feed even the smallest of clans, because they depended on hunting for most of their nourishment. And the hunting was never good enough to support them very well.

From what I heard from Dal and the others, several clans that were related by marriages generally lived in the same area during the summer. We were heading for the summer camping grounds now, up in the hills that lay close to the big double-peaked volcano that dominated the landscape. The clans would spend the summer together, close enough to each other for regular visits, courting, marriages, and exchanges of stories and information. In the autumn they would break up and go their separate ways toward their winter campsites far to the south.

Ava had her suspicions about me also. But her fears all centered on the supernatural. She was the clan's shaman, a combination of herbal physician,

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priestess, psychologist, and advisor to Dal, the clan's leader. It almost amused me to realize how early in human history the roles of priest, doctor, and power-behind-the-throne had come together.

She walked beside me nearly every day, but her interest in me seemed purely professional. She wanted to make certain that if I did turn out to be a demon she would know it and be able to do something about it before I could hurt the clan. She questioned me endlessly about where I came from, and what my clan was like. I didn't mind; I was happy to be with her, even though I knew that each night, when I had to move far from the campfire, she bedded down with Dal.

I had expected that the clan's shaman, or witch doctor, would be an old woman, a crone who had either outlived her mate or never attracted one. It surprised me, at first, that someone as young as Ava would fill the role while she was mated to Dal. Then I realized that there were no old women in the clan. No woman over thirty or so, as far as I could see. The two elders, both men, could hardly have been much more than forty; their shaggy beards were just starting to turn gray. But there were no gray-haired women in the Goat Clan. And of the eight children only three were girls, one an infant still being carried on her mother's back.

I asked Ava what happened to women as they grew older.

"They die," she said calmly. "Their spirits leave their bodies."

"How do they die?" I asked.

She shrugged her slim shoulders. "Many times they die in childbirth, or soon afterward. Some become too sick or weak to keep up with the clan as we march."

"And you leave them?"

Her gray eyes flashed at me. "Of course not! We let out their blood so that their spirits can remain with us. We would not let the spirit of one of our people roam the world all alone."

"I see," I said, and let the subject drop. No need asking her about selected female infanticide. I could see that it was being practiced simply by counting the children.

Women were a liability in this rugged hunting life. They were necessary for procreation, of course, but too many women meant too many babies, too many mouths to feed. So female children were weeded out at birth. Conversely, once a woman was no longer capable of bearing children, her usefulness to the clan was finished and they apparently got rid of her. Not that the men lived much longer: disease and accidents took their toll, and if they were not enough, there was always war. Long before human beings learned to tame the wild ponies that they hunted for food, the Four Horsemen of the Apocalypse kept human numbers in balance with the rigors of the Neolithic landscape.

Without consciously deciding to do so, I was changing that balance. It took me many weeks to realize that it was so. But as I taught the clan how to make bows and arrows, how to dig pits and camouflage them so that animals would fall into them, I began to realize that I was altering—ever so slightly—the ecological balance of this era. For it was not preordained that humans should live in small, scattered hunting groups and survive on the ragged edge of starvation.

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Only their lack of knowledge, their lack of proper tools, kept these hunters weak and vulnerable. Given more knowledge, better tools, they would become the masters of this world.

And eventually build nuclear bombs and vast cities choking in their own filth, I knew. Yet, as I woke up each morning in this dawn of human history and watched these people get ready to work another day with little more than their bare hands, I realized that my choice was the only one I could make. They are part of me, I knew, as human as I am. For me to refuse to help them would be the same as for me to refuse to breathe. No matter what the consequences, I had to choose life over death, knowledge over ignorance, humankind over all the other forms of life in the world.

And then I would see Ava walking gracefully among her people, sipping water from a gourd, tending to a crying infant, and I realized that all my fine thoughts were merely excuses. I did what I did to help this clan because she was here, and I could not face the idea that one day when she grew too slow to stay up with them her clansmen would open her veins and let her spirit leave her body.

My own knowledge of Neolithic technology was shadowy, at best, but I remembered seeing pictures of spear-throwers, long grooved handles that effectively extended the length of the throwing arm and allowed one to fling a spear twice the distance that he could unaided. I experimented for the better part of a week, and finally taught myself how to make one and use it.

Dal's suspicions of me almost vanished when I showed him how to throw a spear farther than any man had before. The bow and arrow he had regarded with misgivings, mainly because I was far from expert at feathering the arrows and they were consequently far from accurate. But the spear-thrower fit into his experience and expectations beautifully. The first day he used it, he brought down a gazelle that fed the whole clan for two nights. I was instantly besieged with requests for more of them. I made three, under the watchful eyes of the men and boys. Then they started making them, and within a week they were building better ones than I could.

Each night I gazed up at the stars longingly, searching their eternal patterns for some sign of where on Earth I might be. Most of the constellations looked familiar. I recognized Boötes, Andromeda, Perseus, and the Little Dipper. Clearly I was in the Northern Hemisphere. The Big Dipper looked strange, lopsided, its stars rearranged. If no other instinct had told me, that would have convinced me that I had moved many millennia through time.

The double-peaked volcano which loomed ahead of us seemed strangely familiar, but I could not place it. When I asked Dal what its name was, he gave me a strange stare. Either this clan did not name mountains, or the name was too sacred to be spoken casually.

The landscape was rising now, and we climbed grassy slopes that grew steeper with each passing day. After almost a week of that, the land flattened out into a broad plateau covered by a dark and gloomy forest. Huge boles of pine and spruce alternated with groves

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of birch trees and mighty oaks. Beneath the trees the undergrowth was sparse, but it grew thick and tangled wherever the green canopy overhead thinned enough to let sunlight filter through to the ground. Dal kept us on a trail that meandered through the shadows of the trees—bare ground, softened by fallen pine needles. Easy hiking.

The forest was rich with game. Every morning the men and older boys went out to hunt boar, deer, and whatever else they could find. Often a few of the women went with them. The other women and younger boys stayed at the campsite, some of them trapping smaller game. I became expert at the sling, and could usually kill a couple of rabbits or squirrels in an hour or so. The clan ate well in the forest. I wondered why they ever left it.

I asked Ava, one afternoon when she had stayed in camp instead of going off with the hunters.

"We go to the valley, to our camping place for the summer," she told me. "There we will meet other clans. There will be marriages and feasting."

I sat with my back against the bole of a huge oak, while she knelt on the thin grass, sorting out the roots and herbs she had spent all morning collecting.

"Why don't the clans meet here in the forest?" I asked. "There's more game here than anywhere else I've seen."

She gave me the kind of patient smile that a teacher might offer a struggling student. "The valley is better. There is plenty of game there. And other kinds of food, as well. Here in the forest . . ." she looked around the gloomy shadows cast by the trees, highlighted here and there with shafts of ghostly sunlight filtering through the leaves overhead, "there are dark spirits, dangerous and foul."

I knew of a dark spirit that was very real. I wondered if Ahriman was lurking in these dreary woods.

"And enemies who can ambush us," Dal's strong voice broke into our conversation. "The forest is an easy place for enemies to trap us."

He strode up to us, strong and confident and smiling through his coppery red beard. Over one shoulder he had slung a young boar, its hind legs tied together by a thong.

Ava jumped to her feet, so obviously happy to see him that I felt instantly jealous and resentful. "Why are you back so soon?"

Letting his catch drop to the ground, Dal pointed and said, "We found a new watering place, further up the hill. All the animals go there to drink. It wasn't there last year; something has dammed the stream to make a big pool. At sundown, we can take enough game to carry us through the rest of the way to the valley!"

By sundown the whole clan was staked out by the watering spot, a large still pool fed by a tiny stream that trickled through the woods from far above, where the snows still lay on the mountainside. Only the two elders, the babies, and the four oldest women had been left behind. Dal brought everyone else and carefully supervised our placement around the pool and on either side of the trail that led to it.

He was confident enough of himself to direct even me to a hiding place. I

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accepted his orders with a smile; Dal no longer feared me, and I felt good about that. I had been accepted.

We waited, hunkered down into the ground, covered with leaves and foliage, hoping that the wind would not change and give away our hiding positions to the animals that would come to the pool for their evening drink.

The afternoon light faded. Birds chattered and swooped through the trees. A procession of ants marched two inches in front of my eyes as I lay on the ground, itching and sweating despite the coolness of the forest shadows. Three spears lay beside me. A leafy oak branch lay over me. On either side of me I could see other clan members, similarly hiding and camouflaged. We were all to wait until Dal made the first move.

We waited. The shadows grew darker. The calls of the birds slackened and stilled. But no animals came to the pool. I began to wonder if something had gone wrong.

Then I heard a snuffling noise from behind me. I dared not turn around to look. I stayed absolutely still, barely breathing. I could hear my heart thumping in my ears. My palms were sweaty. I was as excited as any of these Neolithic hunters; perhaps even more excited than they.

Singly, in pairs, animals came warily down the trail to drink at the pool. Deer, boar, a strange kind of goat, others that I could not identify. They came warily, knowing full well that hunting dogs and wolves lurked in the woods. But they were not aware of the predators who lay hidden in their midst.

With a paralyzing scream, Dal leaped to his feet and threw a spear at the biggest of the deer, hitting the doe just behind the forelegs. It fell, splashing, at the pool's edge. We all leaped up, roaring with pent-up passion, and began killing.

Ava was the wildest one of all, absolutely fearless and as fierce as any demon out of hell. She nailed a fawn with her first spear, then jumped out onto the trail to block the animals' easiest escape route. A tusked boar charged at her, head down, eyes burning with hate. Ava spitted it on her other spear, but the beast's furious charge wrested the weapon from her grasp. I came up beside her and pinned the animal's hindquarters to the ground with my remaining spear. Without an instant's hesitation, Ava straddled the boar's squirming back and slit its throat from ear to ear.

Blood spurted over us both as she leaped to her feet, arms upraised, brandishing her bloody stone knife in the air and screeching like a wild beast herself.

I stood there, suddenly transfixed by this vision of primitive ardor, the deathlust unmasked, unbridled, soaked with the blood of the prey. The killing was still going on all around us, filling the air with screams and the stench of blood. Ava flung her arms around my neck, laughing and sobbing all at once.

"Blood mates!" she shouted. "We killed it together. We have shared a death."

I wanted to share love with her, not death. But to her, the passions seemed much the same.

We carried and dragged the slaughtered beasts back to the campsite, where the elder men and women oohed and ahhed appropriately. All of us were smeared with blood, stinking with the

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lust of killing and the disembowelled entrails of our prey. None of us had been seriously hurt; one of the teenagers had been gashed on the calf, but it did not look serious.

I was still trembling by the time we got back to the camp. I had hunted before, alone. I had hunted with Dal and others of the clan. But this evening's work was something different, something wild and passionate that stirred the savage killer instinct within us all. We had killed far more than we could eat; most of the game would rot before we could get to it. But like sharks in their feeding frenzy, we killed everything we could, sparing only those beasts that were fast enough or lucky enough to escape our spears.

Dal eyed me suspiciously as we made our way back to camp. But he was not worried that I was a spy from another clan or a spirit who would steal his soul. He was simply a jealous human male. He had seen Ava embrace me, and it did not please him at all.

The two elder males insisted that the clan perform a blood ritual to thank the gods for such a miraculous catch. They even wanted me to take part in it, as a representative of the gods. Dal adamantly refused.

"Orion has told us that he is a man, not a spirit," he insisted.

"But we never had such good hunting before he came to us," countered the eldest. "Whatever he says, out of modesty or the wisdom of the gods, he has still brought us incredible good fortune."

I stayed out of the argument, knowing that it was better to allow them to make up their own minds while I kept silent—out of modesty or wisdom.

But Ava spoke up. "Orion helped me to kill the boar. We are blood mates. He should take part in the celebration."

Which, of course, set Dal's mind even more firmly against me. The clan was a rough sort of democracy. Dal was not an absolute ruler. But as in most democracies, a strong-willed minority can usually prevail over the wishes of the majority. Dal was firmly set against allowing me to participate in their tribal ritual. His purpose was reinforced by jealousy and suspicion. The others had only fairness and goodwill to support them. Dal won.

So I sat alone in the darkness, far from the blazing campfire, as the clan danced wildly and split the night with their strange whoops and cries. All around me the tree trunks loomed black and unyielding. They made me think of Ahriman, brooding dark and evilly, as he plotted our extinction.

For hours I watched them, listened to their howls and screams as I told myself that I was glad that I was not one of them, glad to be more civilized than these savages, glad to be separate and apart from them.

I told myself that, over and again.

The eerie cries at last dwindled to silence and the glow of the fire sank to a sullen glower of red among the black pillars of the trees. I finally lay back on the pine needles and closed my eyes to sleep.

Glad not to be one of them. The thought swirled around and around in my mind until I became almost physically sick. I was not one of them. I was alone, totally alone, thousands of years

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away from the nearest friend, my memory so blocked that I did not even know *if* I had a friend anywhere in the whole long continuum of time and space.

It was then that Ava came to me. Even in the darkness I could smell the blood and entrails that smeared her naked body. "You could not come to the ritual," she whispered, her voice still breathless with excitement, "so I have brought the ritual to you."

Part of me was disgusted with her and her primitive blood lust. Part of me knew that Dal would never forgive me for making love with his woman. Part of me was repelled at the thought of taking her in my arms and wallowing in her stench and passion. But with a suddenness that overwhelmed every thought in my mind, I became as wild and fierce as she was, and at least for a little while I was alone no longer.

5

The next morning we resumed our trek northward, each of us staggering under a heavy load of dead game. We travelled under clouds of flies, and the smell of meat decaying in the warmth of the day was enough to make me sick. But no one else seemed to mind it; they all seemed happy with their burdens.

Ava walked up at the head of our little column, beside Dal. If he knew what we had done the night before, Dal gave no sign of it.

Nor did Ava. When I awakened that morning she had already left me and returned, I supposed, to her usual sleeping place beside Dal. She gave me no sign that our relationship had changed. I began to think that what happened under the maddened passion of the clan's blood ritual was a sort of privileged event, not to be considered by the same rules as everyday life, not to be remembered or regretted once the sun rose again.

Two days later we emerged from the brooding forest and started across a broad, sunlit upland where the grass was green and sweet and dotted with flowers. Wild grains sprouted here and there, and lines of trees showed us where streams flowed. The people seemed to grow happier and lighter of heart with every step now. They knew this territory intimately, and they remarked on each and every jut of rock, bend of a stream, stand of grain that we passed.

Ava dropped back to walk with me, one hot afternoon. I had taken to remaining toward the rear of the procession. For some unfathomable inner reason, I had the uncanny feeling that we were being followed, watched. But whenever I looked back, I could see no one, nothing, as far as the horizon. Yet the feeling remained, prickling the back of my neck.

"Soon we'll be at our valley," Ava told me, smiling.

"*Our* valley?" I asked.

She nodded, looking as pleased as a traveler who was at last making her way home.

"The valley is a good place. Others will come there to share it with us. Plenty of water and grain and good hunting. Everyone is happy in our valley."

When we finally reached it, nearly a week later, I saw that it was truly a lovely, sheltered Eden.

We stood by the bank of a gently meandering stream that afternoon, looking down across the valley. The stream

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dropped down in a series of terraced stone steps to the floor of the valley, then made its way along its length and disappeared into the cliffs at the other end. I saw that those cliffs actually formed the base of the big, double-peaked mountain that smoked quietly, far up at the top where snow still lay glittering white under the late spring-time sun.

I could see why the clan was so happy to be here. The valley was sunny and green. From its U-shaped cross section I could tell that it had been scooped out by a glacier, probably from the looming mountain, which had now melted away. It was a very snug niche, quite defensible against invaders. The only easy access to the valley was down the stone terracing of the waterfall, the way we were entering. The trail was slippery, but not terribly difficult to get down. On the other sides, the valley walls rose fairly steeply to heights of several hundred feet.

Our clan was the first to arrive that year. Dal's people raced down the wet stone terraces, laughing and happy, to the valley floor. Before the day ended they had felled some trees and chased some game. By nightfall they had erected a few primitive huts with mud walls and tree branches and hides for roofs. The huts were dug into the ground, more underground than above it, but to Dal's people they seemed like palaces.

One note of sadness touched us that night. The boy who had been injured in the hunt sank into a fevered coma. I had thought at first that the gash on his leg would heal soon enough, but it had become infected despite all that Ava could do in the way of poultices and bandages made from leaves. By the time we had reached the valley the poor youngster could barely walk; his leg was swollen and inflamed. That night he was delirious, burning with fever. Finally he grew quiet and still. His mother sat at his side all night long. With the dawn, her keening cry told us all that her son was dead.

The clan buried him that afternoon, Ava leading a ritual that included lining his shallow grave with all the possessions that the lad had accumulated in fourteen summers: a few stone tools, a handful of smooth pebbles, the winter furs that he had carried with him. Each member of the clan dropped a flower into the grave while his mother stood quietly and watched. Her weathered cheeks were dry; she had finished her crying. Ava told me later that the boy's father had been killed two years earlier, and the woman—whose name was Mara—had no other living children. She was too old to expect to find a new husband. She would probably not survive the next winter.

I wondered how they would get rid of her, but didn't have the courage to ask.

The following morning I walked the length of the valley, following the stream that ran through it. The land must have been tilted by an earthquake, because the stream ran in what seemed to me to be a backwards direction: from the end of the valley where we had entered it splashed down the stone terraces and ran toward the base of the double-peaked mountain. I would have thought that water would flow from the mountain's snow cap outward, in the opposite direction.

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As I walked slowly back toward the collection of mud huts that the clan had built, I saw Ava off among the flowering bushes by the base of the steeply rising valley wall. I angled off my original path and went toward her. I could see that she was gathering herbs and roots for her store of medicines. Little good that they did for Mara's son, Ava's cures were all that these people had to counter disease and injury.

"Hello," I called to her.

She looked up from the foliage she was studying. "What's the matter?" she called back.

Striding through the knee-high brush, I answered, "Nothing's wrong. I was walking down by the stream and I saw you here."

Ava's smile was more puzzled than welcoming. Apparently the idea of taking a leisurely stroll and stopping off to chat with a friend was not commonplace among these folk.

"You're gathering herbs for medicines," I said.

"Yes." Her smile faded. "I wasn't able to save Mara's son. The devil within him was too powerful for me. I must find stronger medicine."

Ten thousand years later, I knew, medical researchers would still be hunting along the same trail.

"You did everything that was possible to do," I said gently.

She eyed me. "You did nothing to help."

"Me?"

"You are a man of great powers, Orion. Why didn't you try to help the boy?"

I was shocked. "I . . . my skills are in hunting, not medicine."

Those deep gray eyes of hers seemed to see straight through to my soul. "You have great knowledge; you know things that none of us know. I had thought that your knowledge included healing."

"It doesn't." I felt awkward, apologetic. "I'm sorry, but I just don't have that knowledge."

She pushed a strand of coppery hair from her face, looking still unconvinced.

"I told you before," I said, "I'm only a man."

Ava shook her head. "I don't believe that. You are different from any man I have ever seen."

"How am I different?" I spread my arms, as if to show her that I was built the same as anyone else.

"It is not your body," she said. "I have tested your body; I have taken your seed. You are strong, but your body is not different from Dal's or other men."

My blood ran suddenly cold. So our night of love-making had not been wild passion on her part, but a carefully considered experiment. Within my mind I heard a self-mocking laugh: *She merely wanted to see what you were made of.*

"Your difference," Ava was saying, "is in your spirit, your soul. You *know* so much more than we do!"

"I know some things, true enough," I said, trying to ignore the laughter ringing within me. "But there is much that I do not know."

"Teach me!" she blurted. "Teach me all the things you know!"

That took me by surprise. Suddenly she was eager for knowledge, avid.

"There are so many things I must learn, so many things I don't know.

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Teach me. Share your knowledge with me," she pleaded.

"I can teach you some things, Ava," I replied. "But much of what I know would make no sense to you. It wouldn't be useful to you or to the clan."

"But you will teach me?"

"If you wish."

"I do!" Her eyes were wide with excitement.

"But why do you want to learn?" I asked.

She stared at me, momentarily speechless. "Why? To know, to understand—that is the important thing. The more I know, the more I can help the clan. If I had known enough about healing, I could have saved Mara's son."

It was my turn to fall silent. Beneath her unwashed skin and rude clothes, Ava was as fully human as Marie Curie, and as inquisitive. More than that, she realized that knowledge was the key to power, that understanding the world around her would help her learn to manipulate that world to her own ends.

But she misinterpreted my silence. Haltingly, she said, "There is nothing I can give you in return for your knowledge . . ."

So the idea of trading sex for power had not occurred to her. I almost smiled at the realization that the world's oldest profession had not yet been invented.

"There are things you know that I don't," I replied. "We will exchange knowledge for knowledge. Fair enough?"

"Yes!" She was almost breathless with enthusiasm.

"All right," I said. "To begin with, tell me what the names of these flowers are, and what healing properties they have."

We spent the afternoon walking through the shrubbery and trading information. I told her that there were substances called metals which could make better tools than the stones and flints the clan used. She explained her wildflower apothecary to me. Gradually I began to lead the conversation toward a discussion of the other clans who came to the valley, and the tribes who were their enemies.

"Do all the clans have hair the color of yours?" I asked.

"No, not at all. Some have dark hair, such as your own."

"And the color of their skin? Are they all the same as ours?"

She nodded. "In the summer sun the skin gets darker, but in the winter it lightens again."

"Have you ever seen a man whose skin is the color of the ashes that remain when a fire burns out? A man who is almost as tall as I am, but much wider, with enormously strong arms and eyes that burn red?"

She backed away from me. "No," she said fearfully. "And I hope I never do."

"Have you ever heard of such a man?" I pressed. "Sometimes he is called Ahriman. Sometimes he is called the Dark One."

Ava was clearly afraid of the very idea. "He sounds like a demon."

"He is a man. An evil man."

She looked at me with a new suspicion in her eyes. "A man. Just as you say you are a man."

I let the matter drop. She did not press it. Instead we began talking about the

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valley, and how much the clan enjoyed spending their summers here. I casually mentioned that they could spend the whole year here, if they prepared for the winter properly. She was instantly curious, and I began to describe how to make warm winter clothing from hides and fur pelts.

She knew about that. But, "What would we eat during the time of snows? All the game animals move to the warmer places. We follow them."

"Instead of killing them," I explained, "you could trap some of them and keep them in fenced-off areas. Let them breed young for you, and you will have meat all year 'round, without moving away from this spot."

Ava laughed. She knew a crackbrained theory when she heard one. "And what will the animals eat during the winter? The grass dies."

"Cut the grass and grain that the animals eat during the summer, when it is high, and store it in huts during the winter to feed to the animals."

Her laughter stopped. She didn't accept the idea; it was too new and fantastic to be swallowed at one sitting. But she accepted the possibility of thinking about it. And that was more important.

We had walked to the face of the cliffs that formed the base of the double-peaked volcano. I decided it was my turn to ask a question.

"Does the mountain have a name?"

"Yes," Ava replied, squinting up into the bright sky to scan its rugged, snow-covered peaks.

"Is the name too sacred to be spoken?"

She turned her gaze back toward me, a new respect in her eyes because I understood their concept of sanctity.

"The smoking mountain can make the ground tremble when its spirit grows angry. The elders tell us that many, many years ago, before they themselves were born, the mountain spilled fire upon the people who lived in this valley and drove them away."

"But they came back."

"Not until long years had passed. They feared the mountain, and taught that fear to their children and their children's children."

I glanced up at the snow-capped peaks. For the first time since I had originally seen them, no smoke came from the volcano.

"It seems to be resting now."

Ava grinned. "Yes, sometimes it rests. But it can still breath fire when its spirit grows angry."

"Would it make the mountain's spirit angry to tell me its name?" I asked.

Her beautiful face pulled itself into a slight frown. "Why do you want to know?"

Smiling, I replied, "Like you, I am curious. I seek answers to questions."

She understood that, the drive to learn, to know. Ava took a step closer to me and whispered the name of the mountain:

"Ararat."

6

Dal was not happy with us when Ava and I returned from our long walk. And he grew increasingly unhappy over the next few days as the two of us spent more and more time together.

At night I took Ava away from the lights of the clan's fires—each family

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had its own small cooking fire in front of its hut now, instead of one single campfire. Off in the darkness I showed her the stars and began to teach her how the constellations formed a vast celestial clock and calendar.

She grasped the concept quickly, and even noted, after a few nights, that at least one of the stars seemed to have moved slightly out of place.

"That's Mars," I told her. "It is not a star like all the others you see. It is a world, something like our own world here, but incredibly far away."

"It is red, like blood," Ava murmured in the darkness.

"Yes," I agreed. "Its soil is red sand. Even its sky is pink with reddish dust, almost the color of your hair."

"The people there must be angry and warlike," she said, "to have made their whole world the color of blood."

My heart sank at the thought that I was helping to invent astrology. But I consoled myself with the notion that such ideas did not occur once only, in a single time and place. Concepts as obvious as astrology would be invented time and again, no matter how ludicrously wrong they may be.

That night we stayed up until dawn, watching the stars wheel across heaven in their majestic cosmic clockwork. And when Venus arose, the Morning Star shining as brilliantly beautiful as anything human eyes could ever see, I heard Ava's sigh of pleasure in the predawn darkness.

I wanted to take her in my arms and kiss her. But she must have sensed what was in my mind, and she moved slightly away from me.

"I am Dal's woman," she whispered. "I wish it were not true, but it is."

I wanted to tell her that I loved her, but with a shock I realized there was no word for such a concept in their language. Romance was yet to be invented. She was Dal's woman, and women did not change mates in this early era.

It was still dark as we walked back to the huts and the embers of the cook fires. Dal sat on the ground in front of his hut, looking miserable, angry, worried, and sleepy all at the same time. He scrambled to his feet when he saw us, and Ava smiled at him and took his arm. They ducked through the low entrance to their hut without either of them saying a word to me.

I stood there alone for a few moments more, then turned and went off to my own dugout, which Dal had insisted the clan build for me—a good hundred yards away from the nearest hut of a clan family.

When I stepped down to the entrance and ducked through it into the shadowy interior of the single room, I immediately sensed that someone else was already inside. Dawn was just beginning to tint the eastern sky, and there were no windows in the hut, nothing but the open doorway to let in light or air. But I knew that I was not alone in the inky shadows of the dugout. I could feel a presence, dark and menacing. I could hear a slow, deep, labored breathing.

"Ahriman," I whispered.

Something moved slightly in the darkest corner of the room. My hand went to the stone knife at my waist. A silly, useless gesture, I knew, but my hand moved of its own accord.

"You expected me to be here, didn't

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you?'' His harsh, tortured voice sent a chill along my spine.

Stepping to one side of the doorway, so that I would not be silhouetted against the growing light outside, I replied, ''You've been trailing us for many weeks.''

''Yes.''

I could barely make out his form, bulking darkly in the shadows. ''You plan to bring harm to these people?'' I probed.

He moved slightly. ''What harm can I do? I am only one man, against your entire race . . .''

''Don't call yourself a man,'' I snapped.

He gave out a wheezing, gasping sound that almost sounded like laughter. ''Orion, you fool! Don't call *yourself* a man.''

''I am a human being,'' I said, ''not one of your kind.''

''You are not one of my kind, true enough,'' Ahriman said, each word labored and grim. ''I am the only one of my kind left. Your cohorts killed all the others.''

''And you seek vengeance.''

''I seek justice.''

''Even if it means destroying the continuum of spacetime.''

''That is the only way to obtain the justice I seek. To tear down the pillars that support the world. To bring it all to an end. To destroy the one who fashions himself as the Golden God.''

''Ormazd.''

''Yes, Ormazd. The master slaughterer. *Your* master, Orion. Your creator.''

''You can't touch him; he's too powerful for you, so you take out your spite on these poor ignorant savages.'' I could feel hatred boiling inside me.

He countered, ''You call yourselves humans. You think you own this planet.''

''We do! This is our world.''

''Temporarily,'' Ahriman's voice rumbled darkly. ''Only temporarily. He built you to conquer this planet, but I will see to it that you are destroyed —utterly and forever.''

''No,'' I said. ''I have already stopped you twice. I will stop you here, as well.''

He paused, as if gathering his forces before speaking again. ''Twice, you say? We have met *twice* before?''

''Yes.''

''Then it's true,'' he muttered, more to himself than me. ''You are moving back toward The War.''

I kept silent.

''The Golden One is very clever. He is moving you backward through the continuum. You have not seen The War yet. You don't know what took place then.''

''I know that my task is to hunt you down and kill you, finally, for all time.''

I sensed a ponderous shaking of his head. ''For all time. I wonder if you realize what that means. None of us, not even Ormazd, can grasp all of time in his hands.''

''That is my task,'' I said.

He made that ghastly chuckling sound again. ''Then why don't you do your duty, here and now. Kill me.''

I hesitated.

''You are afraid.''

''No,'' I answered honestly. Fear never touched me. I was calculating how to get to him. I knew that he was

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far stronger than I. With nothing but the pitiful stone knife in my hand, how could I hope to attack him?

"I grow weary of waiting," Ahriman said.

The shadows exploded. His vast bulk suddenly leaped at me and I was smashed against the mud wall of the dugout, Ahriman's powerful fingers at my throat. We crashed through the flimsy wall and the makeshift roof of leafy branches fell in on us as we struggled in the dust. I slashed wildly at him with the knife, to no avail.

I saw his face inches from mine, a wide leering grin pulling his lips apart, his teeth gleaming wickedly, a brutal snarl growling up from his throat, his eyes blazing with triumphant fury. The strength was seeping out of my muscles. My arms grew weak, my attempts to fend him off feeble. Darkness started to cloud my vision, and I knew that I was about to die.

Something thudded into the ground close to me. Then I felt a muffled shock, as if a hard object had hit Ahriman's body, atop me. His fingers around my throat slackened and I heard him growl. His weight rolled off my body. My vision cleared slightly as I drew in a deep welcoming breath of cool air and I saw him standing above me, a spear dangling from his side, blood oozing from the wound, snarling defiance.

Another spear hurtled through the morning air and he caught it with one hand. Turning, I saw that Dal had thrown it. The other men of the clan were running up toward where he was standing, more spears in their hands. Their faces showed more surprise than fear; as long as their leader was willing to stand up to this strange intruder, they would too—at a distance.

Ahriman flipped the spear around in his hand and pulled his arm back to throw it at Dal. I kicked at his legs and toppled him. The men gave a blood-curdling screech and charged at us.

I scrambled to get on top of the Dark One, but he cuffed me to my knees with a tremendous backhand blow, yanked the spear out of his bleeding side and threw it at the attacking clansmen. Even so haphazardly thrown, it had the force to go right through one of the men, chest to back, lift him off his feet and throw him cruelly to the ground.

That stopped the men of the clan dead in their tracks. All except Dal, who rushed in barehanded except for his puny knife and leaped at Ahriman. The Dark One knocked him away, lumbered to his feet, and staggered off toward the cliffs.

For several moments no one moved. I pulled myself painfully up onto my hands and knees. Dal sat up slowly, shaking his head. A bruise was welling up along his jaw, where Ahriman had hit him.

The other men stood as if transfixed, staring now at the two of us, now at the body of their slain comrade. Ahriman had disappeared into the shadows of the cliffs, where the dawning light had not yet reached.

"Who was that?" Dal asked, at last. He ran two fingers over the lump on his jaw and winced.

"An enemy," I said.

The other men came up to us, all of them chattering at once. Ava pushed her way through them and knelt at Dal's side. She inspected him in the bright-

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ening sunlight and concluded that no bones were broken. Then she turned to me.

"I'm all right," I said, getting to my feet. My throat burned, though, and my voice was hoarse.

The others were staring at me.

"Your throat bears the marks of the enemy," Ava said, examining me. "I can see the print of each of his fingers." She put her hands to my throat. "His hands are enormous!"

"Who is he?" Dal wanted to know.

"The enemy of all men," I replied. "The enemy of every human being. He is the Dark One, an enemy whose only desire is to kill us all."

They had all seen Ahriman, but I described him as closely as I could. I did not want them to begin thinking of the Dark One as a spirit or a demon who was beyond human resistance. I praised them for driving him away, for wounding him and saving me from his choking hands.

"We can follow his spoor and track him to his lair," Ava said, pointing to the bloodstains Ahriman had left on the grass.

The men showed a distinct aversion to the idea. Even Dal, so fearless a few moments earlier, backed away.

"No," I said. "He will have gone deep into the caves by now. We wouldn't be able to find him. He might even have set traps for us. Better to stay here in the sunlight. He won't come back." Not for a while, at least, I added silently.

The rest of the men gathered around their fallen comrade and lifted him tenderly from the ground to carry him back to his hut. I could hear Ahriman's size and ferocity growing as they talked among themselves, and their own courage and strength increasing to keep pace.

Dal lingered near me, Ava at his side.

"You saved my life," I said to him. "I thank you."

He shook his head, troubled. "You are one of us. I did what had to be done."

"It was more than any of the others did."

"I am their leader."

I remembered an aphorism: From those to whom much is given, much is expected. Dal was a true leader, and a good one. But still he looked troubled.

"Ahriman is no more of a spirit or a demon than I am," I said. "He is a man, like me."

"He took a spear in his side and pulled it loose as if it was nothing more than a burr annoying him."

"He has great strength," I admitted.

Reflexively, Dal touched the bluish bruise on his jaw. "That is true. He drove that spear through Radon even while he was on his back."

"But he ran away." I didn't want Dal to fear Ahriman more than was necessary.

His troubled eyes locked on mine. "You did not tell me that you were being pursued by an enemy."

"I didn't know he was here," I half-lied. "I thought I had left him far away from here."

Sensing the beginning of an argument, Ava stepped between us. "Come and eat with us. The sun has already climbed over the hills. It will be a beautiful day."

But now Dal eyed me with new suspicion, even as I felt a bond of respect

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and admiration for the man who had attacked the Dark One with reckless courage, and thereby saved my life.

7

The next few weeks were peaceful enough. Three more clans filtered into the valley, a total of a hundred and six additional people. Roughly two thirds of them were adults, the remainder children ranging from nursing babies to gawky pre-adolescents. In this Neolithic society where life was so short, teenagers became adults as soon as they reached sexual maturity. Twelve-year-olds bore children. Forty-year-olds were often too feeble and toothless to hunt or eat, and were tenderly slain by their clansfolk.

"We stay here in the valley," Ava told me, "until the grain turns to gold. Then we harvest it and carry it with us for the winter." Frowning, she added, "Unless the snows come before the grain ripens."

And in a flash of understanding I knew why Ahriman was here and what he planned to do.

This was another of the crucial nexus points in human history. These clans, these ragged, dirty, wandering hunters, were going to make the transition from hunting to farming. They were going to create the Neolithic Revolution, the step that turned humankind from nomadic savages to civilized city-builders. Ahriman was going to try to strangle that development, prevent it from happening.

If he could keep these primitive hunters from taking that step, he could eventually wipe out all of the scattered human tribes who wandered across this Neolithic landscape. I had no doubt of that. He could annihilate the human race, clan by clan, tribe by tribe, until the Earth was scoured clean of the last human being. Then he would be triumphant.

But if humankind made the transition to agriculture, if humans began the vast population explosion that led to the civilizations of Egypt, Sumeria, the Indus Valley, and China, then not even Ahriman with all his powers could hope to wipe out the entire race. Humankind would be on the path toward mastery of this planet: no longer a few scattered, half-starving tribes of nomadic hunters, but settled, prosperous farmers with a steeply growing population.

Would agriculture be invented here, in this valley where Dal's clan and his allies spent the summer? I could not believe that if Ahriman prevented that invention here it would not occur elsewhere, in some other clan, at some other favored spot. But then I realized that with his mastery of time Ahriman could visit each and every spot where the invention was about to take place, and stamp out the idea each and every time it arose. With a growing weariness hanging like a heavy weight around my soul, I realized that Ormazd would send me to each of those times and places, to do never-ending battle against the Dark One.

Contemplating that was more than I could bear. Almost. I consoled myself with the thought that since Ahriman was *here*, this must be the place where the idea of agriculture truly originated. If I stopped him here, there would be no need to fight him elsewhere—in this era. Obviously we had met at least once

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more in an earlier time. Perhaps during The War that he referred to.

Dal's new suspicion of me quickly spread to the rest of the clan, and the other clans that joined us in the valley stayed well clear of me. I was regarded as something between a god and a human, feared and respected. They all knew that I could teach them wonderful things, but although they came to learn how to make bows and arrows, and spear-throwers, and even how to pen game animals against the cliffs and begin herding instead of simply killing them immediately, they still kept me away from their day-to-day social lives.

All except Ava. She spent long hours with me, learning whatever I could teach her about the stars, about spinning and weaving the wool from goats and sheep, about simple rules of cleanliness and infection.

But each evening she would return to Dal's hut and cook his supper. She invited me to join them often enough, but Dal made it clear that he was uncomfortable with me, and more than a little jealous of the time Ava spent with me. I usually ate alone, outside my rebuilt hut, cooking the meat and vegetables the clanspeople gave me in exchange for my lessons on tool-making and animal husbandry. It would have been funny if it hadn't been so tragic, to think of these primitives learning from me. Actually all I did was expose them to ideas that had not occurred to them. Once the basic concept got into their minds, they went off and did things much better than I ever could have. They taught themselves to make accurate arrows, to build corrals, to spin wool. I merely planted the seeds; they cultivated them and reaped the harvest.

Life in the valley was pleasant and easy. The days lengthened into golden summer, but without oppressive heat and humidity. The grain grew tall and ripened, filling the valley with golden fronds that swayed in the gentle summer breezes. The color of Ormazd, I thought, and realized that it was good. The nights were cool and often tossed by sighing winds. I spent hours showing Ava the phases of the Moon, the paths of the planets, the rise and fall of the constellations. I pointed out the Summer Triangle of stars high in the night sky: Deneb, Altair, and Vega. She learned *quickly, and the questions she asked* showed that she was eager to learn more.

Dal accompanied us during those nights. At first it was because he did not trust me alone with Ava, and I could hardly blame him for that. But despite himself he began to grow interested in the lore of the sky.

"Do you mean you can tell when the seasons will change *before* the change really begins?" He was skeptical.

"Yes," I replied. "The stars can tell you when to plant seed, and when to harvest the grain."

He frowned in the moonlight. "Plant seed? What do you mean?"

That brought us to long nights of talk about how plants grow. I think I might have been the first human being to explain the similarity between the birds and bees, plant growth, and human sexuality. But I did it in reverse of the way 20th-century parents gave the explanation to their children: I used human sexuality—which Dal and Ava understood

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perfectly well—to explain how plants grew from seeds.

Like children, they found the idea difficult to accept. "Do you mean that if we put some tiny seeds into the ground, a whole field of grain would grow there?"

When I said yes, Dal merely shook his head in disbelief. But Ava looked thoughtful, her gray eyes focused on the future.

Except for that one blood-crazed night of the hunting ritual, Ava and I had hardly touched each other. Not that I did not want her. But she was Dal's woman, and her interest in me was the kind for which a word would not be invented for another hundred centuries: platonic. Ava sought knowledge from me, not love or even companionship.

One afternoon, while Dal was leading a hunting party out toward the far end of the valley where they could trap animals against the cliffs easily, I saw Ava staring soberly at the ripening fields of grain. Her face had filled out a bit, as had everyone's belly. Now that we no longer had to trek each day, and game was plentiful, we had all gained weight.

But Ava's face was knotted into such a serious frown that I decided to ask her what the trouble was.

"Ava, what bothers you?"

She seemed startled. "What? Oh—it's you."

"Is something wrong?" I asked.

"Wrong? No . . . not really." She turned her gaze back to the grain, swaying gently in the summer breeze beneath the golden sun.

"You don't believe what I told you a few nights ago," I guessed, "that you can plant the seeds of the grain and grow crops from them."

With a wan smile, she said, "No, Orion. I *do* believe you. What you say makes sense to me. I was just thinking that . . ." she hesitated, and I could see from the concentrated expression on her face that she was struggling to put her ideas in order.

I waited in silence. Her face was beautiful, and I longed to take her in my arms. But she had no desire for me, and I knew it.

"Suppose," she began again, slowly, haltingly, "suppose we really could do it . . . grow grain the way you said. Suppose we stayed here in this valley—all the time, winter and summer. We could grow the grain, we could pen the animals against the cliffs. We wouldn't have to go out each day and hunt. We could stay here and live much more easily."

I nodded. The transition from hunting and gathering to a settled agricultural life had begun, at least in the mind of one Neolithic woman.

"But suppose the grain didn't grow?" she asked me.

"It grows every year, doesn't it? It's always here when you return to this valley."

She agreed, but reluctantly. "It begins to grow when we are away. If we stayed here all the time, would the grain still grow the way it does now?"

"Yes," I said. "You will even find ways to make it grow better."

"But doesn't the grain's spirit need to be alone? Won't the grain die if we stay here always?"

"No," I assured her. "The spirit of the grain will grow stronger if you help

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that spirit by tending the grain, by killing the weeds that choke it, by spreading the seed to new parts of the valley, where the grain does not yet grow."

She wanted to believe me, I could see. But the old superstitions, the ingrained ways of thought, the stubborn fear that change—any change—would bring down the anger of the gods, was struggling within her against the bright promise of this new idea.

"I'm going to take a walk," I said, with a sudden inspiration. "Will you come with me?"

She agreed and I started out across the waist-high field of golden grain, toward the cliffs that the glacier had scooped out on the far side of the valley.

We talked as we made our way to the base of the cliffs, Ava going over the whole idea of agriculture and herding again and again, trying to find out where the weak points were, where there might be a hidden flaw in the scheme, a trap that could bring ruin to the clan.

I could have told her that once the clan stopped its roaming and gave up hunting it would lead to settled farming villages, to an hierarchical society of peasants and kings, to class divisions between rich and poor. I could have told her that the occasional tribal clashes she was familiar with would escalate into wars between villages, then between cities, and ultimately wars in which all the world was bathed in blood. I could have told her about teeming cities and pollution and the threats of overpopulation, nuclear holocaust, environmental collapse.

But I said nothing. Here in the bright morning of human civilization, I remained silent and let Ava examine the new idea for herself.

We reached the base of the cliffs. I squinted up toward their top, outlined against the bright summer sky.

"I think I'll climb up to the top. Want to come with me?"

"Up there?" She laughed. "No one can climb up those cliffs, Orion. You are teasing me."

"No, I'm not. I think we can make it to the top."

"It's too steep. Dal tried it once and had to give up. No one can climb these cliffs."

I shrugged. "Let's try it together. Maybe the two of us can get to the top, where one man alone would fail."

She gave me a curious stare. "Why? Why do you want to climb where no one has climbed before?"

"That's just it," I said. "Because no one has done it before. I want to be the first. I want to see how the world looks when I'm standing in a place where no one has ever stood before."

"That sounds crazy."

"Haven't you ever done something simply because you wanted to do it? Haven't you ever had the desire to do something that no one has ever done before?"

"No," she said. But not very convincingly. She looked up the face of the cliffs and her gray eyes were filled with wondering. "We always do things the way they have always been done. That's the best way, just as our fathers and their fathers did it."

"But somewhere, sometime, one of them must have done a thing for the first time. There has to be a first time for everything."

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She looked sharply at me. I was challenging the safely ordered routines of her world, and she was not altogether happy about it.

But her expression softened and she asked, "Do you really think we could reach the top?"

"Yes, if we work together."

She turned back to look at the cliffs again. They were steep, all right, but even an amateur climber could handle them, I knew. With utter certainty within me, I was sure that Ormazd had programmed me with much more than an amateur's strength and skill.

Ava tore her gaze away from the looming cliffs and turned to look back at the golden fields of grain we had crossed. The afternoon breeze sent a swaying wave through them. She grinned at me.

"Yes!" she said eagerly. "I want to see what's at the top of the cliffs, too!"

We used vines for ropes, and our bare, travel-hardened feet had to do without climber's boots. But the cliffs were nowhere as forbidding as they had seemed at first glance. It was a two-hour struggle, but we reached the top at last, panting, sweaty, weary.

The view was worth it.

Ava stood puffing, grinning broadly, and wide-eyed as we looked far to the east and west and saw valley after valley, river after river, all running southward through golden fields. Above us loomed Ararat, towering high into the cloudless brilliant sky, its snowy cap glistening in the sun, a thin stream of smoke climbing from the higher of its two peaks. And beyond, farther to the north, the land dazzled with ice, glittering like a vast diamond that hurt the eyes if you stared at it too long. That vast glacier still covered much of Europe, I knew, although it was retreating northward as the Ice Age surrendered to a more humane climate.

"There's so much to see!" Ava shouted. "Look at how small our valley seems from here!"

"It's a big world," I agreed.

She gazed down into the valley again and slowly her face lost its exultant happiness. She began to frown again.

"What's wrong, Ava?"

Turning toward me, she said, "If we lived away from the others, if we found a valley for ourselves where no other clan lived . . . just you and I together . . ."

I felt my jaw go slack. "What are you saying?"

There were no words in her language for what she was feeling.

"Orion," she said, her voice low, trembling, "I want to be with you, I want to be your woman."

I reached out to her and she fled into my arms. I held her tightly and felt her strong, lithe body press against mine. For an eternity we stood there, locked in each other's arms, warmed by the summer sun and our own passionate blood.

"But it cannot be," she whispered so softly that I could barely hear her.

"Yes, of course it can be. This world is so large, so empty. We can find a valley of our own and make our home in it. . . ."

She looked up at me and I kissed her. I didn't know if kissing had been invented yet by these people, but she took to it naturally enough.

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Yet when our lips parted there were tears in her eyes.

"I can't stay with you, Orion. I am Dal's woman. I can't leave him."

"You can if you want to . . ."

"No. He would be shamed. He would have to organize the men of the clan to hunt us down. He would have to kill you and bring me back with him."

"He'd never find us," I said. "And even if he did, he'd never be able to kill me."

"Then you would have to kill him," Ava replied. "Because of me."

"No, we can go so far away . . ."

But she shook her head as she gently disengaged herself from my arms. "Dal needs me. He is the leader of the clan, but how could he lead them if his woman deserts him? He is not as confident as you think; at night, when we are alone together, he tells me all his fears and doubts. He fears you, Orion. But he is brave enough to overcome that fear because he sees that you can be helpful to the clan. He places his responsibility to the clan above his fear for you. I must place my responsibility to the clan above my desire for you."

"And me?" I asked, feeling anger welling up inside me. "What about me?"

She looked deep into my eyes. "You are strong, Orion, with a strength that no ordinary man has. You were sent among us to help us, I know that. Taking me from Dal, from the clan, would not be a help. It would destroy Dal. It could destroy the clan. That is not why you have come among us."

I could have replied. I could have simply picked her up and carried her off. But she would have run back to her clan the instant I relaxed my hold on her. And she would have hated me.

So I turned away from her and glanced at the sun, low on the western horizon.

"It's time to start back," I mumbled. "Let's go."

8

The grain grew taller than my shoulders, and the people of all the clans grew more excited and impatient to harvest it with each passing day.

I stayed aloof from them. I had taught them all I could. Now I waited, just as they did. But not for the time of harvesting. I waited for Ahriman. He would return; he was planning his attack on these people, on me, on the whole future existence of the human race. I waited with growing impatience.

I combed the valley, poked into the caves among the rocky cliffs, seeking the Dark One. All I found were snakes and bats, clammy cold dampness and dripping water. And one cave bear that would have crushed my skull with a swipe of its mighty paw if I had not been fast enough to duck out of its way and scramble out of its cave before it could get to me.

I knew he was there, somewhere, biding his time, picking his point of attack. All I could do was to wait. Ormazd did not appear to me again to give me more information, or even the slight comfort of showing me that he still existed and still cared that I existed. I was alone, placed here like a time bomb or a buried mine, waiting to be triggered into action.

Ava kept her distance from me. And the less I saw of her, the more I did of

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Dal. He came by my hut almost daily now. At first I thought he was trying to work up the nerve to pick a fight with me. But gradually, as he tried to strike up a conversation in his halting, pained way, I realized that he was trying to work up the nerve for something else, something that was far more difficult for him than merely fighting.

"The grain will be ready to cut soon," he said, late one afternoon. I was sitting on the ground in front of my hut, fitting a new flint blade to the stone hilt of my knife. One of the clan's elders was an artist when it came to making sharp flint tools; that was why he was allowed to remain with the clan even though he was too old and slow to hunt.

Dal squatted down on his haunches beside me, forcing a smile. "If it doesn't rain in the next two days, then we can cut the grain."

"That's good," I said.

"Yes."

I looked up at him. "What's troubling you, Dal?"

"Troubling me? Nothing!" He said it so sharply that it was clear he was deeply bothered.

"Is it something that I've done?" I asked him.

"You? No, of course not!"

"Then what is it?"

He traced a finger along the dirt, like an embarrassed schoolboy.

"Is it about Ava?" I asked.

His glance flicked up at me, then down to the ground again. I tensed.

"It concerns her," Dal said, "and the things you've been telling her. She thinks we should stay here in this valley . . . all the time."

I said nothing.

"She claims that you said we could pen the animals against the cliffs and stay here even when the snows come," he gushed out rapidly, as if afraid of stopping, "and next spring we can plant seed from the grain all across the valley and make more grain than anyone has ever seen before."

He looked at me almost accusingly.

"I told you these things, too," I replied. "I told you both."

Dal shook his head. "But she really believes them!"

"And you don't."

"I don't know what to believe!" He was honestly confused. "We live well here, that's true. We could move into caves when the snow comes. As long as we have fire we can stay in the caves and keep them warm and dry."

"That's true," I said.

"But our fathers never did this. Why should we stop living the way our fathers have always lived?"

"Your fathers have not always lived this way," I told him. "Long ages ago, your ancestors lived far from here, in a land where it was always warm and they could pick fruit from the trees and live a life of ease and happiness all year long."

His eyes showed that he did not want to believe me. But he asked, "Why did they leave such a paradise, then?"

"They were driven out," I replied, "by a change in the climate. The trees withered. The land changed. They had to move elsewhere. They began to roam the land, as you do, following the herds of game."

"But each year the herds get smaller," Dal said, his mind focusing on the present and dismissing old legends that he

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only half believed. "Each year we must travel farther and our kills are harder to make."

I gestured toward the fields. "But the grain grows high. And there are enough game animals here to feed all the gathered clans, if you keep them penned up and let them breed. They will provide you with all the meat and milk and wool you need, if you learn how to take care of them."

He was truly perplexed. It was a gigantic hurdle for him.

"The grain is good," he admitted slowly. "We make food from it—and a drink that makes you feel as if you're flying."

Bread and beer, the two staples of farming. I wondered which offered the bigger lure in Dal's mind and swiftly decided that beer would be more important to him than bread.

"Then why not stay here, where the grain grows so well? You can store it in the caves after you've cut it. If you grow enough grain, you can even feed some of it to the animals you keep."

With a deepening scowl, Dal wondered aloud, "But what would the spirits of our fathers do if we stopped following the game trails? How would they feel if we turned our backs on their ways?"

I shrugged. "They will probably rejoice that you have found a better way to live."

"The elders say that the grain won't grow if we stay here all year long."

"Why wouldn't it grow?"

"Its spirit would wither if we watched the fields all the time."

I wondered if the elders were groping toward the idea of environmental pollution. But I said, "The grain grows just as the sun shines and the rain falls. It is all completely natural, and it will happen whether you are here to watch it or not."

"Hunting is good," Dal muttered. "Hunting is our way of life."

And I'm going to destroy that way of life and turn you into farmers. In my heart, I could see that Dal's every instinct was urging him away from the strange new ideas I had planted in his mind. For untold thousands of generations humankind had been hunters. Their minds and bodies were shaped for hunting; their societies were built around it. Now I was telling them that they could live fatter, easier lives by giving up their hunting ways and turning to farming and herding. It was true: farming would be the first step toward total domination of the planet by humankind. But they would have to turn their backs on the "natural" lives they now led; they would have to abandon the freedom they had, the rough democracy in which each clan member was as good as any other.

For an instant I wondered if I was doing them any good. But then I realized that it was not a choice between lifestyles; the choice these people had was between farming and eventual extinction. They would have to pay a bitter price for survival, but it was either pay that price or die.

Is this part of Ormazd's plan? I wondered. Does Ormazd have a plan? Or is he merely determined to keep himself safe from the Dark One, no matter what it costs? As I sat there studying Dal's face, so deeply etched with doubt and concentration, I was tempted to tell him

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to forget the whole thing and keep on living as he had always lived. But then I thought of the boy who had died of a simple infection. I thought of how lean and ragged these people were when they were following the game trails and living off what they could catch each day. I remembered that their elders were at an age that would be considered still youthful in later centuries. I realized that the clan's hunting life kept them just barely alive; they lived constantly on the edge of extinction. Ahriman would not have to push hard to wipe out the human race.

"Hunting has been your way of life, it is true," I said to Dal, "and a good way of life for you and the clan. But it is not the only way. It is not the best way."

He looked unconvinced, and very troubled. Dal was an honest, forthright man. He did not know what to believe, and he was too honest to make up his mind before he was convinced, one way or the other.

"Ava wants to stay," he muttered, "but the elders say we must not."

I put a hand on his shoulder. "Talk to the clan. Talk to all the people who have come to the valley. Tell them what I have told you. If you like, I will speak to them myself, and tell them how the grain grows. The spirits of your fathers will not be angry with you; they will be pleased that you have found a better way to live."

He smiled slowly. "Do you really believe they will be pleased?"

"Yes. I'm sure they will be."

Dal rose to his feet and stretched his cramped legs. Nodding his head, he told me, "I will talk to the clans. I will tell them what you have told me."

He felt relieved. He didn't have to make the decision. He would put it to a vote. That lifted the burden from his shoulders. Or so he thought.

Even in this simple Neolithic society, with fewer than a hundred adults to deal with, it took three nights before Dal could assemble all the people to listen to him. I was fascinated to watch a primitive bureaucracy at work. Each clan had to discuss the idea of such a meeting within itself, with the elders going into painstaking detail on how such clan conferences had been arranged in the past, where their clan sat in relation to other clans, who was responsible for building the fire, who would speak and in what order. For these supposedly unsophisticated folk, the occasion of a clan gathering was an event, an entertainment, as well as a serious time of decision-making. They savored the arrangements and the protocol, fussing over the details for the sheer enjoyment and excitement of having something to fuss over.

At last the clans gathered around a big central bonfire that had been built closer to the Goat Clan's huts than any other clan's. The elders of each clan spent the first few hours of the night retelling their most important stories, each old man establishing his clan's history and stature by sing-songing legends that each person sitting around the fire knew by heart, word for word. But they all sat through each tale of monsters and heroes, gods and maidens, bravery and cunning and seemed to enjoy themselves thoroughly—or at least as much as a 20th-century family would enjoy

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spending an evening watching television.

Finally it was Dal's turn to put his proposition to the assembled multitude. It was fully dark now; the night was well advanced. Overhead, despite the glowing fire, I could make out the stars that presaged autumn: my namesake Orion was climbing above the saw-toothed horizon, looking down at me. He seemed different from the way I knew him from earlier eras, still easily recognizable, but vaguely lopsided. And there were four bright stars in the Belt instead of just three.

Dal was no orator, but he spoke in a plain, clear way about the idea of staying in the valley through the winter. He hemmed and hawed a little, but he got across the basic idea that the clans could pen the animals against the cliffs and slaughter them at their leisure instead of tracking them down, and that they could live off the grain that grew in the valley, and even grow more grain than sprang up naturally.

Everyone listened patiently without interrupting, although I could see many of the elders shaking their heads, their gray beards waving from side to side in perfect stubborn unison.

Finally Dal said, "And if you want Orion's words about it, he will be glad to tell you. This is all his idea, to begin with."

A man Dal's age, from the Wolf Clan, jumped to his feet. "We are not meant to stay in one place! This valley is prepared for us each year by our spirit-fathers. How can they prepare the grain if we stay here watching all year long? The spirits will go away and the grain will die!"

Dal turned uneasily toward me. I had been sitting to one side of the Goat Clan's area, placed off at the end so that I was almost by myself, in a space between clans. I got to my feet and took a single step closer to the fire, so that they could all see me well. I wanted them to see for themselves that although I was a stranger, I was a man and not one of the forty-armed monsters the elders had sung about earlier.

"I am Orion," I said, "a newcomer to this part of the world. I love to hunt as much as any man here. But I know that there is a better way to live, a way that will bring all of us much comfort—a way that will keep us well fed all year long. Babies will be fat and healthy even in the winter's worst cold and snow. We will all be able to . . ."

That was as far as I got. An explosion of blood-curdling screams shattered the night, and flames seemed to burst all around us.

Everyone jumped every which way. A spear thudded into the ground near my feet. Screaming and yelling erupted from everywhere as men and women toppled, spears driven through their bodies. The bonfire hissed as blood spattered onto it. The clanspeople ran for their huts, terrified.

But not Dal. "They're burning the grain!" he roared. "Get your weapons!"

Through the flickering flames I saw naked men painted in hideous colors dashing toward the huts. Some held torches, other had spears.

"Demons!" Ava screamed. And they did look unhuman, the way they were painted, with the firelight glinting off their glistening bodies.

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Dal had already yanked a spear from the body of a fallen clansman and was running toward one of the enemy warriors. Ava dashed in behind him, scooped up a fallen spear, and advanced to his side. Another spear whizzed past my head. A trio of the strange warriors dashed into one of the huts. Screams of pain and terror wailed from it.

All this happened in seconds. I rushed for my own hut, knocked down two warriors who tried to stop me, and grabbed my bow and a handful of arrows. I could hear more shouting and sobbing outside, and Dal's voice clear and commanding over the din of confusion and battle.

As I ducked back into the night air outside my hut, a painted warrior sprang at me, his spear levelled at my chest. I sidestepped and floored him with a lethal chop to his neck. Over his body I stepped, out into the flame-filled screaming furor of the battle, my reflexes accelerating into overdrive, every sense alert and sharpened to its finest pitch. I felt a wild exhilaration: the waiting was over, the battle had been joined.

I nocked an arrow and sent it through a warrior's skull. Dal and Ava were off to my right, using their spears to fend off four spear-wielding warriors. I knocked off one of them just as Dal ripped another's belly open. Ava dropped to one knee as a warrior charged her and spitted him from below. The screaming man fell atop her, but she wriggled out immediately, took his spear, and rejoined the fight. By that time I had put an arrow through the neck of the fourth warrior.

In the light of the blazing grain I could see many of the clanspeople on the ground. But there were more of us on our feet, fighting. The invading warriors were falling back now, throwing their torches at us to slow our pursuit.

Sheer maddened anger drove me forward. I raced at them, bellowing mindlessly as I fired my remaining arrows into them and then took a spear from a fallen warrior and charged them with all the fury that had been pent up inside me, waiting for this release. I knocked down the first one to stand before me with a sidelong swipe of my spear against his skull, using the weapon like a quarterstaff. Another loomed to my side, and I drove the spear point into his guts. He screamed as I yanked it free and slashed it across the face of the next one.

It seemed longer, but within mere seconds my spear was bloodied along its whole length, slippery in my grasp, as I slaughtered anyone who came within reach. The remaining warriors bolted, wide-eyed with newfound fear, and I raced after them, killing, killing, killing again as I caught up with them, one by one. Behind me I could hear the shouts of Dal and the others growing fainter.

I followed the retreating warriors toward the distant cave-dotted cliffs. One of them stumbled and fell in front of me; I drove my spear through him and felt it bite into the dirt. He shrieked with his last breath. Tugging hard, I yanked it free again and resumed my chase after the others.

The invaders were scattering in all directions, their weapons thrown away as they ran for their lives to escape my bloody rage. I slowed and turned. Far behind me, Dal and the others had

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turned their attention to the fires that the invaders had started in the grain fields. I saw Ava, smeared with blood of her enemies, standing triumphantly and waving both arms over her head, urging me to come back.

But I pressed onward, toward those caves, where I knew Ahriman lurked. It was the Dark One who had organized this raid, no one else. He was there, and I moved relentlessly to find him, my hands already soaked in the blood of his cohorts. Like an automaton running wild, I stalked the Dark One, longing with every ounce of my being to add his blood to that which was already darkening my spear.

It was black by the base of the cliffs; not even the glow from the burning field cast much light there. But in that hushed gloom, where even the insects and beasts of the night lay silenced and frightened by the rush of fighting men, I heard breathing and the soft tread of bare feet on stony ground.

There were three of them, off to my left, waiting to attack me. Another two were further to my right, ready to circle behind me and close the trap.

I moved forward, as if unaware of their presence. But the instant they leaped toward me I whirled around and swung my spear at their legs like a scythe, cutting the three of them down. As they fell in a jumbled heap, I hefted the bloody spear in my right hand and threw it at the nearer of the two who were circling behind me. The solid *thunk* of it hitting his chest was louder than the desperate little gasp he gave as he died. I killed the three on the ground quickly, with my bare hands, while the only remaining warrior fled for his life.

I took all three of their spears and headed toward the nearest cave. I had no way of telling if Ahriman was there; all I know is that I was certain he would be.

The cave was pitch-dark inside; not a single glowing ember lit its yawning blackness. But I plunged into it anyway, hot with reckless fury.

It was the cave bear's warning growl that saved my life. If the beast had been as intent on killing as I was, it would have waited until I had blundered into its grasp and then crushed me with its mighty paws. But it was only an animal defending its lair; it had none of the malicious hatred that human beings carry within them. It growled before it slashed out at me. I lunged forward at the sound with all three of the spears bundled together in my grip. I was lucky. I hit the bear's heart or lungs. One of the spears snapped in my hands, but the other two penetrated and the animal died with a hideous shriek of agony.

Suddenly the blood lust cooled within me. I was dripping with sweat, covered with blood from head to toe, trembling with physical exertion and emotional exhaustion. Killing the other humans had meant nothing to me, but killing the bear had snapped me out of my battle fury. There in the utter darkness of the beast's cave, I doubled over, hands on knees, panting and almost weeping with shame and regret.

For several minutes I remained there. Gradually my strength returned, and with it my resolve. Ahriman was here, I knew it. I could *feel* it. The bear might have been one of his defenses, to be used against me as he had once used

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rats in a man-made cave to kill the woman I loved.

I wrestled one of the spears from the bear's still-warm body, stepped over the carcass, and started to grope my way into the ever-deeper darkness of the dank cave. Eyesight was useless in this black pit, but all my other senses were fully alert, stretched as far as they could reach.

But just as I could see nothing, I heard nothing. Not a sound, except my own ragged breathing and the almost inaudible padding of my bare feet on the cave floor. My left hand slid along the rough stone wall; my right held the spear. I advanced cautiously, probing the darkness like a blind man, seeking the enemy that I knew lurked somewhere up ahead of me.

The sudden glare of blinding light paralyzed me, and then a tremendous blow to my head thrust me into darkness once more.

9

I felt the chill of death, and as I opened my eyes I saw that we were in a cave of ice. Cold, glittering, translucent ice surrounded us. The floor and walls were smooth, polished blue-white. The ceiling, high above, was craggy with frozen stalactites. I could see my breath puffing from my open mouth. I shivered involuntarily.

We were far underground, beneath the rocky surface of Ararat. A natural hiding place for the Dark One. Ahriman sat, incongruously, behind a heavy broad slab of wood, like a thick slice taken from a full-grown tree. The top of the slab was burnished to a gloss so fine that I could see the reflection of his dark, brooding face and powerful neck and shoulders in it.

I was sitting up, my back propped against an outcropping of stone. My head thundered from the blow I had received, but with a conscious effort I eased the tension in my neck muscles and directed the capillary blood flow to reduce the swelling. The pain began to slacken.

Behind Ahriman's menacing bulk I could see a dully gleaming cannister. It seemed to be made of wood also, but a dense black wood that almost looked like metal. Its top half was hinged open. It looked to me more like a coffin than anything else.

Ahriman sat silently behind the wood slab of the desk, staring into its gleaming surface as if he could see things in it that I could not. I shifted slightly, testing my reflexes. I was not bound; my arms and legs were free and seemed to respond to my commands with no difficulty.

He looked up at me, his eyes glaring. The Dark One wore a skin-tight suit of metallic fiber, sealed at the throat with a gleaming stone whose colors changed and shifted even as I watched. The metallic suit glittered in the cave's soft lighting. I looked up, but could see no lamps, only a glow that seemed to be coming from the ice itself.

"Bioluminescence," Ahriman said. His voice was a grating, painful whisper.

I nodded, more to test my aching head than to agree with him. The pain was receding quickly.

"Your people put out the fires quickly enough," he said. "The grain is rich

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with moisture. I should have waited a week; it would have been drier then."

"Where did you get those warriors?" I asked.

A grim smile flickered across his almost lipless face. "That was easy. There are plenty of tribes of your people who are eager for the chance to murder and loot. They think of it as glory. They go back to their miserable hovels with a clutch of heads they've cut off and tell their wives and children what powerful men they are."

"You tempt them to do so."

"They don't need much temptation. Killing is a part of their way of life; it's built into them."

"You're going to fail here, you know," I told him. "We will meet again."

"Yes, you told me. You have met me twice before."

"Which means you will fail here. You will not succeed in preventing these people from developing agriculture—"

He raised a massive hand to stop me in mid-sentence.

"How certain you are," Ahriman whispered harshly. "How absolutely sure that you will triumph, that you are right, that the Golden One represents truth and victory."

"Ormazd is . . ."

"Ormazd is not even his true name; you must realize that by now. It is merely a fabrication, a lie, a simplification that he feels is necessary because your mind was never made to grasp the entire truth in all its endless facets."

Anger began to warm me from within. "I know enough of the truth to understand what you intend."

"The destruction of your kind is what I intend," Ahriman said, "even if it takes all of time to accomplish it. Even if it means tearing apart the continuum and destroying the whole universe of spacetime. I have nothing to lose. Do you understand that, Orion? *I have nothing to lose.*"

His red eyes were burning at me. I felt the power of his anger, his hatred, and something more—something that I could not identify, something that felt like sorrow, eternal and everlasting.

But I spat back, "You'll never win! No matter what you do, it's you who'll be destroyed."

"Really?"

"You will fail here, just as you failed in other times. You can't stop the human race."

He leaned his powerful arms on the tree-slab desk and hunched forward, looming before me like a dark thundercloud.

"You pitiful fool, you don't understand the nature of time even yet, do you?"

Before I could reply, he went on, "Simply because we have met before, in other centuries, in other places, does not mean that you will defeat me here. Time is not a railroad track that's laid down in place, one section at a time, and fixed solidly, unmovably. Time is like a river—or better yet, an ocean. It moves, it shifts, it washes away a bit of the land here and throws up a new island there. *It is not immutable.* If I succeed here, the eras in which you and I have already met will dissolve back into primeval chaos, as if they never happened."

I stared at him for long silent mo-

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ments. Then I said, "I don't believe you. You're lying."

He shook his head slowly, ponderously. "I can win here, Orion. I will. And all of spacetime will be disrupted. The continuum will crumble, and those times and places where we met will cease to exist."

"It can't be true!"

"But it is. And you know it is. I will destroy all of you, you who call yourselves *Homo sapiens sapiens*. All of you who are Ormazd's creations. You and he will dissolve into nothingness together, and my people will triumph at last."

"Never," I said, but so softly that I barely heard it myself.

Ahriman ignored me, gloating, "Your little band of savages will not make the transition from hunting to agriculture. Nor will any other of your tribes. Your people will remain a small, weak, starving collection of scattered hunting tribes—*with the instinct for war built into you.*"

He stressed that last phrase, savored it, hissed it at me as if it were a justification for everything he had done, every life he had taken, every evil he had committed.

"It will be easy enough to get your bloodthirsty tribes to slaughter each other, given enough time," Ahriman went on. "All that I need do is lead them into collision courses, bring two tribes together unexpectedly. Your own savage instincts will do the rest for me."

"The clans don't always fight when they meet," I argued. "They're working together in the valley . . ."

"Only because they know each other. And only because food is plentiful in the valley. But they are such wasteful, wanton fools. Already they have thinned out the game herds and driven some beasts into extinction. Food will become scarcer for them, I promise you."

"If they don't turn to agriculture," I muttered.

"They won't. And when one of your wandering bands of hunters bumps into a strange group, they will annihilate each other."

I shook my head stubbornly, refusing to believe him. "There are too many human tribes for you to destroy them all. They're spread out all across the world . . ."

"Not so," Ahriman said. "The glaciers cover a good part of the northern hemisphere. And even if they did not, what difference does it make to me? I have all the time in the world to kill off your wandering tribes of savages. Think of it! Centuries, millennia, eons! A long, delicious feast of killing."

His pain-red eyes glowed with the thought. I sat still, silently calculating my chances for leaping across the desk and crushing his throat before he could stop me.

"And in the end," Ahriman went on, his face as close to happiness as it could ever be, "when your primitive bloodrinkers have finally slaughtered each other, the wrenching of the continuum will be so severe that the Earth, the Sun, the stars and galaxies themselves will collapse in on themselves. A temporal black hole. The end of everything, at last."

I jumped for his throat. But from the expectant leer on his dark face I realized that he had made the same calculation that I had, and placed himself just far

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enough from me to give himself time to block my lunge. I saw his powerful hands clench into fists and launch themselves straight at my face. Pain exploded in my brain. I blacked out again.

I awoke to the sound of trickling water. I lay on hard stone, in utter darkness. It took a long time before the throbbing in my head stopped, even though I exerted every effort to control my nervous system and shut off the pain.

When I tried to sit up I bumped my head against solid rock. I probed upward with both hands and found that I was tucked into a narrow cleft of stone. I felt a blank rock wall on my right; on my left, an edge that dropped off into nothingness.

Ahriman was gone, I knew. Off to accomplish his task of driving the clans out of the valley or killing them altogether. I had to get free and prevent him from winning.

Vision was useless; there was no light at all. The trickling water noise came from below me. Carefully, I turned myself over onto my stomach and groped down along the ledge as far as my arm would reach. No bottom. I poked around for a loose pebble, found one, and dropped it over the edge. Straining my ears, concentrating all my attention, did no good. I waited for what seemed like hours, but heard no splash. I found a larger piece of rock and tried it again. The seconds moved slowly, slowly—and then I heard a faint *plonk*. There was water down there, far below. I began inching forward, not knowing if I was moving in the right direction. The rock seemed to slope slightly upward, but that did not necessarily mean it was heading toward the surface, I knew. But there was nothing else I could think of. So I crawled, blind as a mole, inching along without knowing where I was heading. No sounds reached me except my own breathing and the scrabbling noises of my body scuffing along the rock ledge, and the far-off murmur of running water.

Slowly I began to realize that the rock was getting warmer. Magma from the volcano, I reasoned. Perhaps I was moving deeper underground, rather than toward daylight.

I stopped, panting in the dank heavy air, and tried to think it out. That got me nowhere; I simply did not have enough information. Then I tried to put myself in Ahriman's place. What was he going to do?

Destroy the Goat Clan, came the answer.

How? I asked myself. The attack on the clans had failed. They would be on guard now. Instead of driving them out of the valley, the attack probably made them realize how precious the grain fields were. They might well have decided by now to stay in the valley yearround, to protect the grain against marauders.

But Ahriman is no fool, I told myself. He would have foreseen that.

Then the true purpose of the attack must have been to entice the clans into staying in the valley. But that did not make sense—unless Ahriman planned to destroy the clans and the valley itself, together!

How? Earthquake? Could the Dark One control tectonic forces? I didn't know. But the answer came to me soon

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enough, as I lay there in my lightless prison of rock. I heard a loud, slapping, sloshing noise from far below me. A wave was surging through the underground river that flowed down there in the darkness.

"A flood," I said aloud, my voice strangely hoarse and muffled against the close confines of rock. My thoughts raced. Underground heat to melt underground ice. The stream that runs through the valley will burst out of the mountainside in an uncontrollable flood. The clans will never have a chance of getting out. The valley will be drowned, together with everyone in it.

Even as I lay there it was beginning to happen. The water was lapping noisily below me, getting closer, rising to where I lay trapped in this prison of stone. I would be the first one to drown. Ahriman had planned well.

Going through death and being reborn does not make you eager to face death again. Ormazd was in control of my destiny, I knew, but the more I learned about the Golden One and his powers, the more I became aware of his limitations. If he had the power, he would have dealt with Ahriman directly, without need of me or any intermediary. He had power enough to pull me through death and project me into another time and place—at least twice. But what assurance did I have that he could do it again, or would do it again, or even that he knew where I was and what I was facing.

I felt totally alone, facing the choice of waiting for the water to rise up and drown me, or plunging down into it and trying to find a way back out to daylight. Time was vital. If I survived at all, it was crucial that I get to Dal and Ava in time to warn them of the flood.

I made up my mind, took a deep breath, and rolled over the edge of the rock and dropped like one of my tossed stones down toward the water. There was plenty of time for me to be frightened; the fall was a long one. I oriented my body feet-downward, the best way to take such a dive. I found myself wondering how deep the water was; I might break my neck before I drowned.

The water felt like cement when I finally hit it, and then I was plummeting deep, deep down in icy black water, every nerve shocked numb, no sensory input except a painful bubbling in my ears.

I bobbed to the surface at last, took a deep happy breath, and half swam, half rode the current wherever it was leading me. I had the feeling it was in the direction opposite to the one in which I had been crawling.

After what seemed like hours, I banged my flailing arms against solid rock. The river swirled and surged against a blank wall, but I could feel from the undertow that it dipped into a deeper tunnel and kept flowing on. There was no airspace in that tunnel, I realized, but I had no choice except to follow it. I filled my lungs and then dove under, letting the current carry me along.

The oxygen in my lungs was soon exhausted, yet the river still flowed in its natural tunnel. I began to squeeze oxygen from the spare cells of my body, consciously shutting down whole muscle systems and organs that I didn't need, taking their stored oxygen to feed to my heart and brain and limbs. I began

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to die, bit by bit, like the lights of a city winking out in a power failure one section after another. Desperately I slowed down my heartbeat and turned myself into a virtual catatonic, passively flowing along the underground river, starving for oxygen, not knowing if I would ever see the light of day again.

It seemed as if months went by, but finally the darkness around me began to brighten and I floated to the surface of the river.

Air! Real, breathable air. It tasted wonderful as my body returned to life and I gulped in huge lungfuls of the most precious substance on Earth.

The river was emptying itself into a huge cave, turning it into a vast underground cistern. I dragged myself up onto dry, rocky ground, every part of my body jangling from lack of blood circulation. Sunlight filtered from an opening in the vast cave, far overhead. I was much too weak even to try to reach it.

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For hours there was nothing I could do but lie on the rock-strewn dirt and try to recover my strength. But every moment of that time the water behind me rose higher, splashing and gurgling as it filled this natural underground cistern. Soon enough it began lapping at my feet as I lay stretched prone on the damp ground.

I forced myself to stand and began scrabbling up the sloping wall of the huge cave toward the opening where the sun's light streamed in. The bare earth was loose and pebbly, difficult to climb. With each step forward I was in danger of sliding all the way back. But I struggled upward and finally pushed myself through the narrow fissure of rock and out into the daylight.

Looking back, I saw that the underground river was filling up the cave. When it reached the rock ceiling, the water would have nowhere to go but outward, exploding through the rock that held it back, gushing down into the valley below with the force of a tidal wave that would sweep everything before it.

I staggered down the steep slope of the valley wall, my legs weak and rubbery from exertion. Through blurring eyes I could see the valley spread out below me in the late afternoon sun, beautiful, peaceful, vulnerable. I had to get down to Ava and Dal and warn the people.

Tottering with exhaustion, I made my way toward the grain fields. People were at work there, cutting down the long golden stalks with their flint knives. I made my way to them.

"Look!" came a shout from one of the men. "It's Orion!"

"He's come back from the dead!"

They dropped their work and gathered around me, keeping a respectful distance.

I raised my hand in greeting, but before I could utter a word to them, exhaustion and hunger took their inexorable toll. I blacked out.

Ava's taut, lovely face was staring at me when I opened my eyes again.

"You are alive," she said gravely.

"Yes," I croaked. "And starving."

Looking around, I saw that I was in my own hut, lying on the matted grass that we used for a pallet. I could see a crowd of clanspeople pressing at the

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doorway, peering in. Food of every description was piled high in the middle of the room; gifts from the people, I supposed.

Ava turned from me momentarily. Within seconds one of the other women had pushed her way into the hut, bearing a gourd of steaming broth. I sipped at it, burning my tongue. But it felt good and strengthening as it slid down my innards.

"Where's Dal?" I asked, my voice more normal. "We've got to get the people out . . ."

"Eat first," Ava crooned. "Get your strength back."

I put the gourd to my lips and gulped down all of the broth. She tried to get me to lie back again, but I gently pushed her hands away.

"I've got to see Dal."

"Were you in the land of the dead?" asked the woman who had brought the gourd.

I shook my head, but her eyes were round with awe. "What was it like? Did you see my son there? His name is Mikka, and he was four summers old when he died of a fever."

Ava shooed her away, then came back to me.

"You were in the land of the dead, weren't you?" she asked softly.

I saw that the people cramming my doorway believed that, no matter what I said. Ava did too, with that mistaken simplicity of logic that says: Dead people are buried underground; Orion has been underground; therefore Orion has been in the land of the dead.

"Dal," I whispered urgently. "I must talk to Dal. We've got to leave this valley. Quickly!"

"Leave? Why?"

"There is going to be a flood. We'll all be drowned if we stay here. Find Dal and bring him here. Now!"

She turned and told one of the men to bring Dal. Looking back at me, Ava said, "Dal was wounded in the fighting three nights ago."

"Badly?"

"His leg was slashed by a spear, just above the knee."

Infection, I thought.

"It's not a very bad wound, but I've made him stay on his pallet to rest. I've kept the wound covered with leaves and poultice."

I got to my feet and headed for the doorway. The people melted away from me, almost in a panic. I had been in the land of the dead and then returned. There was fear in their eyes, and a desperate curiosity to know what lay beyond death. Grimly I strode through their midst toward Dal's hut, thinking to myself that their primitive superstition was truer than they knew: I have been through the land of the dead, more than once.

In the slanting late-afternoon light I could see that the stream cutting through the valley was already broader, noisier, and moving faster than it ever had before. And its direction had reversed. It was flowing from the base of the cliffs out toward the waterfall at the other end of the valley, where the two flows met to form a growing, frothing pool.

Off in the distance I heard a low rumble and felt the ground shudder. All the clanspeople looked toward Ararat's smoking crest.

"Orion walks and the mountain speaks to him," I heard a woman say.

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The others mumbled agreement.

I said nothing. For the moment, their awed respect for me was useful; I was going to give them commands that they had to obey swiftly.

Two of the clan's teenaged boys were helping Dal to his feet when I stepped into his hut, Ava trailing a step or two behind me. His leg did not seem swollen, beneath the leaves that she had plastered over his wound. Perhaps he would survive, after all.

"Let him sit," I told them, and they lowered Dal back onto his pallet.

He looked me over in the gloomy shadows inside the hut. "We thought you were dead. But we could not find your body."

"I am still alive," I said. "But we will all be killed if we don't get out of this valley right away."

Dal winced as if I had slapped his face. "What? Leave the valley? But I thought . . ."

"There is going to be a flood," I said. "Soon. Very soon. Perhaps only a few hours from now. It will drown this whole valley and everything in it."

"But the stream has never . . ."

"Dal," I snapped, "have I ever lied to you? There will be a flood. I know! If we stay here we will all be killed. We must leave. *Now!*"

He looked up at Ava.

"There's no time for argument," I said. "We must tell all the people, all the clans, and move out now, this hour."

"Up the steps of the waterfall," Ava said.

I realized that would be impossible. The first stage of the flood was creating an ever-deepening pool at the base of the waterfall. We could not get out of the valley the way we had come in.

"No," I said. "We must go up the cliffs along the side of the valley."

Dal looked shocked. "No one can climb those cliffs!"

"I will show you how to do it," I said.

"But it can't be done. We're only ordinary people; we can't fly!"

"We can climb," Ava said firmly. "Orion and I climbed the cliffs one day, more than a month ago."

He stared at her, began to object, then shook his head. It was more new information than he could take in, I thought. But when he looked down at his leg, stiff and tender from the spear wound, I realized that Dal was worried about his own survival.

A roar of thunder shook the ground. But it did not come from the heavens. The sky to the north flared an angry red, and I could hear fearful moans from the people outside the hut. The volcano was smoldering, preparing to erupt. Ahriman was flexing his muscles.

"There is no time to lose," I said. "We must leave now."

With a nod, Dal said, "Go ahead. Ava, you direct the clan. Call the elders in here: I'll tell them that you will be in charge until they can pick another leader."

"But you're coming too!" she said.

He pointed to his wounded leg. "How can I? I couldn't even climb those cliffs when both my legs were whole."

I was terribly tempted to agree with him. It would be difficult enough to get more than a hundred men, women, and children who had never climbed before to make it safely up the face of the cliffs.

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A man with a bad leg could slow us down to the point where the flood waters would overtake us before we reached safety. And if Dal stayed behind, I would have Ava to myself once we had put the flood behind us.

My eyes locked on his. He was clearly afraid; he believed me and knew that if he stayed behind he would die. Yet he was willing to sacrifice his life for the safety of his clan. Bravery or stubbornness or just plain stupidity —whatever was driving him, I simply could not leave him there to die.

So I bent down and hauled him to his feet. Moving to the side of his bad leg, I grasped him firmly around the waist.

"Put your arms across my shoulders," I commanded, "and lean your weight on me."

"You can't . . ."

"Don't argue with me!" I snapped. "There isn't enough time."

Ava beamed at me as we hobbled out of the hut. Dal began shouting orders to the people. Teenagers were sent scampering off to warn the other clans. Women collected whatever food they could from their huts. Men gathered their tools and weapons.

"The grain!" Ava realized. "What's going to happen to the grain?"

"It will be swept away by the flood," I said.

"No!" she said. And she ran off toward the field, gesturing two of the teenaged girls to come with her.

Ararat grumbled again, making the earth tremble. Hot steam was boiling up from the volcano's cone now, and I knew that worse would soon follow. The gentle stream was rushing and roaring now, already overflowing its banks here and there and edging into the grain field as it burbled the length of the valley and splashed into the lake that was growing at the base of the waterfall. The waterfall itself was angrier, more powerful, pouring an ever-stronger torrent down the stone terraces and into the widening lake. Mist rose from the lake and caught the slanting rays of the dying sun in a diabolically enticing rainbow.

"This way," I shouted as the people began to gather around Dal and me, frightened, confused, casting terrified glances at the angry stream and the angrier volcano.

"Do as Orion commands!" Dal told them. "Only he can save us. Do not anger the spirits of the dead by failing to obey him."

That calmed them a little. Tell us what to do, give us a direction, lead us—anywhere, just as long as you seem to know what you're doing. That's all it takes to stop a frightened crowd from turning into a panic-stricken, self-destructive mob.

We headed toward the cliffs, away from the flooding stream. I hauled Dal along, his weight dragging against me as he hobbled along on his good leg. Over my shoulder I saw the people of the other clans streaming after us, following blindly. But I could not find Ava's face in the growing crowd.

We made it to the base of the cliffs at last, and I sat Dal down on a rock. Picking two of the wiriest teenaged boys, I lashed us together with ropes made from vines and took the lead in scrambling up the cliff face. The boys were young enough so that they did not know what was impossible, as their eld-

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ers did. They followed me with barely a false step.

We made it to the top, where the setting sun was still above the horizon. Looking below, I could see that most of the valley was in shadow now. And the stream was spreading its growing fingers in all directions, rapidly flooding the grain fields and edging toward the huts the clans had built. The waterfall at the far end of the valley was lost in mist now, and I could hear its thundering roar even from this distance.

Working quickly, we tied the ropes to trees and dropped them down to the people waiting below. I ordered the boys to remain where they were, then rappelled down the cliff and started the others climbing upward.

Dal watched with unabashed admiration as the people hauled themselves up the steep rocky wall, pulling hand-over-hand along the ropes.

"Have you seen Ava?" I asked.

"No . . ."

"Here we are!" she called.

I looked up to see her and the two girls carrying big leather sacks on their backs, grinning wearily as they neared us.

"We've got as much of the cut grain as we could carry," she said happily. "All the seeds that you told us about, Orion. And roots and berries, everything we could find. We're bringing it with us. We'll plant the seed next spring."

I could sense myself smiling broadly. Glancing up at the smoldering volcano, I thought that Ahriman had lost. The idea of agriculture had found good soil here and taken root. And the legends that would be handed down from generation to generation for hundreds of centuries before writing was invented would garble the story of Ararat: it was a woman, not Noah, and she saved the species of grain and fruits that would feed the human race, not animals who could escape the flood under their own power. Mythology was usually based on a kernel of fact, but what distortions the male-dominated tribes would make of this story!

All through the deepening twilight the clanspeople worked as they had never worked before. The volcano's rumblings grew stronger, angrier, and it began to spout black smoke streaked with red flame. The sky turned black, and flashes of lightning strobed the darkness, frightening the people even more. By ones and twos and threes they climbed, scrabbled, groped, inched their way up the ropes we had set out along the cliff face, hauling themselves up to the safety of the top. The sturdiest of the teenagers and young men helped the older and less agile. Babies rode on men's backs. I made the journey up and back down again a dozen times, at least, helping everyone I could.

Dal sat on the rock at the base of the cliff, keeping the people organized down there, calming their fears and holding their panic at bay.

Ararat was growling at us now, and its sullen red glow lit the evening hours for us. I could see boulders the size of houses flying up out of its crater, and burning tongues of lava spilling over the lip of the volcano's cone. The ground trembled with each roar of the mountain, but there was no true earthquake —not yet.

Slightly more than half the people had

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made it to the top of the cliff when the flood burst upon the valley. The rock wall where the stream had been gushing forth exploded in a mammoth shower of water and steam, hurling boulders halfway down the valley. The cistern that I had been in earlier that day had not only reached its overflow point, but the heat from the tectonic forces that Ahriman had unleashed had turned the cistern into a mammoth tea kettle. The water had finally come to a boil and the expanding steam blew open the side of the mountain like a kiloton charge of explosives.

A wall of white water blasted down the valley, roaring like all the demons of hell let loose at once. Steam hissed into the dark sky and a hot rain began to fall on us.

I was halfway down the cliff, returning to help another pair of people up to safety, when it happened. I could see it all clearly despite the darkness, and I saw the people still down at the base of the cliff standing frozen in terror as that all-consuming wave hurtled toward us.

"Move, move, move!" I bellowed, letting go of the rope and jumping the rest of the way down the cliff, landing with a shock on the balls of my feet and rolling over twice to absorb the impact.

The people jerked to frantic life, dozens of men and women suddenly scratching up the cliff to save their lives. Others clambered down from the top, risking their lives without a moment's thought to help their friends and relatives.

Dal got to his feet, leaning heavily on a spear. He was staring at the angry flood of frothing hot water as it surged toward us, swallowing everything in its path.

The volcano erupted truly now and the ground shook hard enough to knock people loose from the ropes as they climbed up the cliff. They fell: bones broke. Screams of agony and terror pierced the darkness over the roar of the flood and the volcano.

I helped those I could, racing among the fallen to set them on their feet and start them up toward the top again. Teenaged boys scrambled down to help others.

Then I saw Dal standing there watching us, his face set in a stubborn mask of self-control. He neither frowned not cried for help. He leaned on his gnarled spear shaft, his injured leg held out stiffly, as he watched his people climbing to safety. Behind him, the raging hot waters of the flood roared and thundered closer, closer.

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With a yell, I grabbed one of the dangling vine ropes and ran for Dal. He raised one arm to protest, but I grabbed him and looped the rope under his shoulders before he could stop me.

"Hold onto the spear," I shouted over the roar of the approaching flood. "Use the strength of your arms to make up for your bad leg."

"I can't make it!" he shouted back. "Save yourself, Orion!"

"We'll both make it. Come on!"

I half carried, half tugged him to the base of the cliff and gave him an upward shove. Whoever was on the other end of the rope, up at the top, understood what I was trying to do and began hauling in the rope. Dal used his spear like

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a crutch as I scrabbled up the cliff beside him. The rain was making the rock slippery, and I nearly fell more than once.

We were barely a quarter of the way up the cliff face when the flood smashed against the base of the rocks, splashing boiling hot foam against me and sending Dal spinning on the end of the rope. He lost his spear and screamed with sudden pain. I automatically clamped down on my own pain receptors as the boiling water seared my legs. Grabbing Dal, I pushed and grunted and shoved the two of us higher. The water clawed at us, trying to drag us down into its steaming clutches.

I got one hand on the rope and gripped Dal around the shoulders with my other arm. Slowly, slowly, we inched up the cliff as the water rose behind us, seeking us, pulling at us, cooking the flesh of our legs as we desperately climbed toward safety.

Suddenly I heard Ava's voice shouting commands, and we were lifted by what could only be the strength of many hands. Miraculously, it seemed, that strength hauled us roughly up the cliff, out of the water's boiling grip, and landed us wet, bruised, burned, exhausted at the top of the cliff.

I lay there like a fish hauled out of the sea, squinting up through the hot rain at a ring of faces peering down.

"Are you all right?" Ava asked, over and over. "Are you all right?"

It was Dal that she was talking to. I sat up, wincing as I allowed the pain receptors in my legs to resume their normal function. Both legs were scalded, but the damage did not seem too serious. Ava was kneeling beside Dal, already smearing some kind of ointment over his reddened legs.

He turned to me. "You saved me, Orion."

"As you saved me, once."

"I owe you my life," he said.

With a shake of my head, I said, "No, you owe your life to your people. Lead them well, Dal. Find another valley and make it your own."

Ava turned to me. "We will. We will live as you told us to live, Orion. We will start a new life."

I should have felt happy, but there was nothing inside me except the pain of realizing that Ava would go with Dal, that she had to, and that I would be left alone once again.

I turned to peer through the darkness at the flood surging below us. It frothed and lapped at me, as if angry that I had escaped and trying to reach higher to get at me.

"You'd better take the clans to higher ground," I said, "until the flood goes down."

"Up the mountain," Dal agreed.

"But it's shaking, burning," Ava said.

"That won't hurt us," said Dal, sure of himself once again. "When the flood is over, we will find a new valley to live in."

"Good," I said. The rain was slackening, but I could still hear the flood waters boiling below us. "You'd better get going now, without delay."

"But what about you?" Ava asked.

"I'll stay here. You don't need me any longer."

"But . . ."

"Go," I commanded.

Reluctantly, they left. They made a

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litter for Dal and said a brief little prayer for those who had been killed; and then the band moved off, many of them limping, toward higher ground.

I sat there, willing my scalded legs to heal, waiting for the inevitable. I looked out across the valley in the deepening darkness, lit now only by the surly glow of the volcano's fiery grumbling. The flood waters hissed and growled below me. I could feel the steam wafting up from their surface. The whole valley had been turned into a boiling cauldron. Ahriman had done his work well—but not well enough.

"You think you've won." It was his labored, rasping voice in the darkness.

Turning toward him, I said, "I know I've won."

His ponderous bulk seemed to congeal out of the shadows to loom over me as I sat on the ground, my legs poking straight out awkwardly.

"Nothing will grow in that valley for a long, long time," he said. "Your superstitious little band of hunters will be so afraid of returning to it that . . ."

"They won't have to return," I interrupted. "They've brought the seeds of their grains with them."

His red eyes flashed. "What?"

"And they have the seed of a new idea in their heads," I went on. "You've lost, Ahriman. Those hunters will survive. They'll turn into farmers and flourish."

He did not bother to argue or to deny the truth of what I had told him. He did not rant or shout with rage. He stood there in silence for a long time, thinking, calculating, planning.

"It's checkmate, Dark One," I said. "There's no way you can stop them now. You've done your worst, and they've stood up to it."

"Because of you," he rumbled.

"I helped them, yes."

"For the last time, Orion." He strode swiftly to me and picked me right up off the ground, his powerful hands squeezing my ribs like a pair of steel vises. He held me up in the air, my legs dangling uselessly.

"For the last time!" Ahriman shouted, and he threw me over the edge of the cliff, down into the boiling water below.

But in that last instant I grabbed him around his bull neck and held on with all my strength. For half an instant we hung there on the edge of the cliff, the two of us teetering there in the darkness, and then we toppled together downward into the raging water.

The boiling water was a shock of agony as we plunged into its depths. We've beaten you again, I exulted silently as the water hissed and bubbled all around me. And maybe this time is the final encounter; maybe this time I've finished you once and for all.

The water surged over me, dragging me down into its hot depths, boiling me, flaying the flesh from my bones. I gave way to pain and death, my last hope being that this would truly be the end of it all. ■

● Bureaucracy is a giant mechanism operated by pygmies.

Honoré de Balzac

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Probability Zero

WASHOUT

Richard A. Brouse

I didn't really invent the transport booth. I barely discovered it—pure serendipity. What I was looking for was a golf sock.

You've probably had similar experiences. Lois had told me for years that unfamiliar socks, handkerchiefs, and other articles were showing up in her wash and that some of our things were disappearing the same way.

My usual comment was, "Your boyfriends should make sure they put their own clothes back on," to which she would retort, "Are you sure you aren't accidentally swapping clothes with somebody?" Neither of us took it seriously. We are pretty secure with each other. I never took the laundry mystery seriously, either.

Then Kathy, our granddaughter, was born. Lois had to do grandmother duty, which left me on my own resources for a time. That's how it happened.

It was my first batch of laundry. I was sitting in the den watching the Texas Rangers lose another ball game while I folded clothes from the dryer, and there it was: the unexpected, unfamiliar sock.

I raised my eyebrows over it, but maybe I just hadn't noticed it when I loaded the washer. Then one of my golf socks turned up missing.

Now, THAT was peculiar. The washer had tangled up some things, and I had seen both golf socks when I untangled the mess and loaded the dryer. They both had to be there!

One of them wasn't. Neither was it still in the dryer, nor was it anywhere between the dryer and the den. The dryer must have eaten it.

I don't give up easily, and those were my favorite golf socks. With tool box and dryer manual, I set out to recover it.

It wasn't anywhere in the guts of the dryer, and there just wasn't any place for it to have gone. Damn!

I spent hours reviewing my investigation.

Fact: Both golf socks had been put in the dryer.

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Fact: One golf sock was gone.

Fact: There was no place for it to have gone.

Fact (almost overlooked): A different sock was in its place.

Conclusion: This is impossible.

Unless . . .

I went back to the den to look at that other sock.

It wasn't an ordinary sock. It was a baseball stocking with the name of a Chattanooga, Tennessee high school on it, and it had the initials "G E B" embroidered into the toe.

I mulled my next move for a long time.

Was I enough of a damned fool to do what I was thinking of? (You know darned well that I was.) The next morning, I called that school and asked for the baseball coach.

No, I didn't tell him I was trying to find a mysteriously missing golf sock, or that I was trying to return a baseball sock that I couldn't possibly have. (Sane people rarely give information to lunatics.) My cover story wasn't brilliant, but it worked. When I hung up, I had the name of the only member of the team with those initials, and I had his parents' names. I didn't get a phone number or address, but fortunately the number was listed.

"Why, yes!" replied Mrs. Brown, when I asked if her son's baseball sock had disappeared recently. "Just last night. George almost tore the house apart looking for it. If he doesn't win today's game and that baseball scholarship, he says it will be my fault. Where did you find it?"

"In my dryer, here in Fort Worth, Texas," I answered. Then I wondered if I had been too direct. There was no way the sock could have gotten from Tennessee to Texas in the same night.

There was a brief silence on the other end of the phone. Then Mrs. Brown asked, "Are you missing a red and blue plaid sock? I found one in the dryer where George's sock should have been."

That clinched it. I set up an experiment. On the third try, we managed to reverse the exchange of socks. My favorite golf socks were once more a pair, and George had his lucky socks for the big game.

That wasn't all. I had attached a ton of scientific instruments to the dryer. They gave me the information I needed to build that prototype pair of transport booths. The rest is history.

But when someone mentions the transport booth in Lois's presence, she gives me that little grin that means, "I told you so!" ■

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THE UNSEEN UNIVERSE: QUARKS & THE NEW ETHER

Kei Moriyasu

A Question of Force

A popular theme in science fiction is to imagine life under the most bizarre conditions possible, such as extreme heat or cold. A recent novel by Robert Forward described the evolution of a highly intelligent life form on the surface of a neutron star where the temperature is greater than 8000°. And, of course, science fiction writers also have speculated about life at the opposite extreme of ultra-low temperatures. But

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real life may have come up with a scenario that is even more bizarre.

Let's ask seriously just what kind of life could exist at a few degrees Kelvin, under which perfectly good insulators act like the best of superconductors. Give up? The answer is us: you, me, and everyone else in known space. According to the latest theories in elementary particle physics—known as "unified gauge theories"—we may all be living inside a gigantic superconductor. That's right—the universe looks like a superconductor.

How did physicists arrive at this bizarre notion? It happens to be the most reasonable answer so far to a question we have been asking ourselves ever since Newton and the apple. If you have ever taken Physics 101 or the equivalent, the instructor probably told you that there are four different kinds of "fundamental" forces in the universe. Two of these forces—gravitation and electromagnetism—are a familiar part of our daily lives. The other two are more exotic: the "strong" and "weak" nuclear forces. The strong force holds atomic nuclei together and the weak force sometimes causes them to decay and produce radioactive waste.

The question is, why are there four kinds of forces? Why isn't there just one universal force? This question is the most fundamental in all of physics. The answer is the "Holy Grail" which physicists have been seeking ever since the discovery of the nuclear forces nearly 50 years ago. Now a part of the answer has been found. Within the last ten years a revolution has quietly occurred in physics—a revolution called "gauge theory." Gauge theory tells us for the first time not only why the fundamental forces are different but how they became that way.

The Long and the Short of It

Why does a universe that looks like a superconductor have anything to do with the difference between the fundamental forces? To answer that question, we have to ask what really is the difference—the essential difference— between the fundamental forces. It is obvious that electricity, gravity, and the nuclear forces have many differences, but the most important has to do with the "range" of the forces.

Electromagnetism and gravitation are both "long-range" forces, while the nuclear forces are "short-range." One electron in our galaxy can reach across the light years to another electron in the Andromeda galaxy and exert a repulsive force on it. The force will be minuscule, but it will not be zero.

On the other hand, the ranges of the nuclear forces are about the size of a proton, which is one thousandth of a billionth of a millimeter. That's why the atom is mostly empty space. The electrons can whirl about in orbits a million times larger than the nucleus because they're held in place by the long arm of electromagnetism. But the protons and neutrons in the nucleus are literally squashed together by the short-range nuclear force.

So the question now is, why are the ranges of the fundamental forces so different? The answer is the superconductor universe.

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The Superconductor Answer

What is so special about a superconductor that it can give us a clue to the secret of the fundamental forces of the universe? The best known property of a superconductor is that it is a perfect conductor. It has no resistance; a current will keep flowing indefinitely without the help of an external voltage. But a superconductor demonstrates another peculiar property known as the "Meissner effect."

If you bring a superconductor near a magnet, the superconductor will not allow any magnetic field lines to penetrate it. The explanation is simple. When the magnetic field tries to enter the superconductor, it induces a flow of current. This induced current generates its own magnetic field, which then cancels the external field. But the cancellation is not perfect. If you look at a thin layer on the surface of the superconductor, you will see that the magnetic field actually penetrates a short distance into the superconductor. So if you imagine a tiny physicist living inside the superconductor, she will say that the magnetic field looks like it has a "short range" in her own universe.

The New Ether

In the early 1960s several physicists, among them Peter Higgs of the University of Edinburgh and Phillip Anderson of Bell Labs, realized that some variation of the Meissner effect might also explain why the nuclear forces have such short ranges. How can that be? After all, the universe is not filled with niobium-tin or some other superconducting material. You have to postulate (assume, guess, hand-wave) the existence of a new type of fundamental field which fills the entire universe like the old-fashioned pre-Einsteinian ether. This new ether is called a "Higgs field" and it is supposed to have just the right properties to act as a superconductor.

If the universe is filled with a new kind of ether, wouldn't we have detected it before? Not necessarily. If you want to detect something or measure something, you have to use one of the fundamental forces. Any electronic measuring instrument uses electromagnetic forces. If the new ether does not have an electric charge or any other electromagnetic properties, it will be undetectable by any electronic instruments. In particular, since our eyes operate with light—which is simply electromagnetic radiation—the new ether will be literally invisible (and tasteless and odorless). Thus the new ether must have some exotic properties which are visible only to the nuclear forces.

Internal Quantum Numbers

What are the exotic properties that distinguish the nuclear forces from electricity or gravitation? They are called "internal quantum numbers." A simple example of an internal quantum number is the difference between a proton and a neutron. A proton is not just a neutron with electric charge; it has another exotic property called "isotopic spin." The name was coined by Werner Heisenberg, one of the founding fathers of quantum theory. Isotopic spin is similar to ordinary spin, which electrons and protons both possess. But isotopic spin

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is supposed to exist only in an "internal nuclear space" and not in our usual four-dimensional space-time. Thus isotopic spin is visible only to nuclear forces. The proton and neutron can be thought of as right-handed and left-handed states of isotopic spin. Isotopic spin is also the nuclear "charge" carried by protons and neutrons in the same way that electrons carry electric charge.

Let us suppose that the new ether also has exotic properties like isotopic spin. What will happen to a proton or neutron in the ether? The proton or neutron act like charges which produce a nuclear force field around them. The nuclear force field will try to penetrate into the surrounding ether like the magnetic field tried to penetrate the superconductor. If the new ether acts like a nuclear superconductor, the force field will be cancelled out, and the force will then look as if it has a very short range.

A Complication of Quarks

If you are willing to believe in a new ether, the scenario that I have sketched so far looks very appealing. All of the fundamental forces really are long range. It is only the new ether that makes the nuclear forces look as if they have short ranges. Unfortunately, real life is never that simple. About the same time that Higgs and Anderson were inventing the new ether, other physicists were discovering that the proton and neutron are not really elementary particles after all. A new generation of particle accelerators had been built and physicists began smashing protons together at very high energies to see what would happen. Dozens of new, exotic particles were created in the collisions. There were so many different kinds that it became obvious that they couldn't all be elementary or fundamental. The same type of thing happens when a uranium atom fissions in a nuclear reactor. The fission products contain other atoms such as bismuth or strontium, but that doesn't mean that bismuth and strontium are the fundamental building blocks of a uranium atom. All atomic nuclei are built up of protons and neutrons. So it was postulated by Murray Gell-Mann of Cal Tech and Yuval Ne'eman of Tel-Aviv University that the proton, neutron, and all other exotic nuclear particles are actually made up of three fundamental particles called "quarks."

Quarks are truly fascinating objects and deserve an entire article to themselves. Several such already have appeared in *Analog* (see the articles by R. Carrigan and M. Silbar in the bibliography). Quarks are very odd beasts. One of their most peculiar properties is their electric charge, which is supposed to be only a fraction, either ⅓ or ⅔, of the electron charge. However, the oddest thing by far is that quarks are now generally accepted as the fundamental building blocks of nuclear matter, but the quarks themselves have never been seen!

It is reasonable to guess that quarks are probably not much heavier than protons. So if you smash two protons together at energies a thousand times greater than the mass of the proton, you should see some quarks in the debris. It doesn't happen. No one has managed to produce a quark in a nuclear collision so far. That means that quarks are a lot

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heavier than we have any reason to believe or that something very bizarre is happening. At the moment, the smart money is betting on the second possibility.

The extreme shyness of quarks forces us to modify our scenario of the superconductor universe. Somehow, whatever is making quarks act so bashful does not care about the electron or the neutrino. Let me explain.

There happens to be a very common radioactive decay process which involves not only nuclear particles but also the electron and neutrino simultaneously. This process is called the "beta decay" of the neutron. Any neutron which is floating around by itself in space will spontaneously decay, with an average lifetime of about 15 minutes, into a proton plus an electron and an antineutrino (the anti-matter version of the neutrino). What is strange about this process is that there are no quarks in the debris of the neutron. Instead, the quarks are still locked up inside the proton that appears. So the strong nuclear force, which binds quarks together inside the neutron, is perfectly willing to allow a radioactive decay to transmute the neutron into a proton and to cause electrons and neutrinos to appear spontaneously, but it won't allow any free quarks. This is the kind of puzzle that can give you a headache, but it's also what keeps physics so interesting.

So what is the explanation? The logic gets a little tortuous here, but basically it's a case of using Occam's razor, i.e., finding the simplest interpretion. First of all, it stands to reason that whatever is making the quarks so shy must be related to the short range of the strong nuclear force. Why? Because the purpose of the strong nuclear force is to bind quarks tightly together inside the proton and neutron. The new ether was invented to explain the short range of the nuclear forces. Can it also explain why quarks are hidden?

The answer is probably not. The new ether was copied from the original Meissner effect in the superconductor, which certainly does not hide electrons from view. And the "beta decay" of the neutrons shows us that the new ether does not cause the weak force to "hide" electrons or neutrinos. So it appears that the new ether can produce short-range forces but can't hide particles. In fact, Occam's razor forces us to conclude that the only purpose of the new ether is to explain the short range of the weak nuclear force.

This kind of logic is sufficiently tricky that we ought to see if there are any loopholes. Suppose we assume that the short range has nothing to do with hidden quarks. Then we could still use the new ether to explain the short ranges of both the strong and weak nuclear forces. But now we also have to invent an entirely new property of quarks to explain why they are so shy. What is this new property? It must be a new exotic type of nuclear force that operates only on quarks, and not on electrons and neutrinos. But that's really just a circular argument, because again we have to explain why this new exotic force also has a short range. So what is the explanation for the hidden-quark trick? You'll have to wait a bit for the rest of the answer while I take a short detour.

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How to Build Your Own Unified Gauge Theory

Up to now, we haven't really said much about gauge theory. It's the recipe that will tell us how to combine the different fundamental forces together into a single "unified field theory." We can already see how to do it.

First, imagine that the new ether doesn't exist, so that the weak nuclear force has a long range just like electromagnetism. Now we can "add" the two forces together. But isn't that illegal—like adding apples and oranges? This type of addition is allowed because the two forces are really different "components" of a single force. Consider a sailboat on a river which is flowing southward. There is also a wind blowing toward the east so that the sailboat moves in a south-easterly direction. The total force on the sailboat is pointing southeast, but the force has two components—the river and the wind—which are pointing in different directions. In the same way, the electromagnetic and weak nuclear forces are two different components of a single unified "electro-weak" force.

Now we fill the universe with new ether. The weak nuclear force suddenly has a very short range. But the electromagnetic and weak nuclear forces are still part of a unified electro-weak force. We used to believe that the electromagnetic and weak nuclear forces were separate forces because they had such different ranges. The presence of the new ether just made it very difficult for us to realize that the two forces were closely related.

* * *

The Weinberg-Salam-Glashow Unified Theory

The gauge theory recipe sounds simple but it took nearly fifty years of very difficult research to arrive at it. The name "gauge theory" and the basic ideas of the theory were first suggested by Hermann Weyl in 1919 just after Einstein developed his theory of general relativity. The word "gauge" is a misnomer; Weyl used it originally to refer to a scale or length while trying to improve on general relativity. Just as Einstein proved that gravity could be related to the geometry of a curved four-dimensional space, Weyl attempted to show that the electromagnetic force was related to the unit or scale of distance in space-time.

But Weyl had the right idea at the wrong time. As we now realize, gauge theory is a quantum theory. The scale or "gauge" that Weyl suggested does not exist in ordinary space-time. It exists only in the "internal nuclear space." But in 1919, quantum mechanics had not yet been invented and the only elementary particles were the electron and the proton.

Forty years later, C. N. Yang and Robert Mills rediscovered gauge theory and tried to use it to understand the strong nuclear force. But they couldn't explain why the strong nuclear force had such a short range, so gauge theory was forgotten once again.

The final rediscovery of gauge theory is credited to Steven Weinberg of MIT (now at the University of Texas), Sheldon Glashow of Harvard, and Abdus Salam of Imperial College, London. In

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1967 Weinberg and Salam simultaneously and independently published the first explanations of how electromagnetism and the weak nuclear force could be unified. The first Weinberg-Salam theory only worked for particles like electrons and neutrinos. Glashow and some colleagues showed how to include quarks in the new theory. But in order to make everything fit, they had to invent a new type of quark, called a "charmed" quark. The actual discovery of the charmed quark in 1974 is described in an *Analog* article by Richard Carrigan (see the bibliography). The new unified theory of Weinberg-Salam-Glashow not only explained the gauge theory recipe and the new ether but also predicted some totally new kinds of elementary particle reactions. These new reactions were so rare that they had not been seen before. How did the physicists of the world react to the heralds of the new physics? Paraphrasing Churchill, Sidney Coleman of Harvard described the general reaction: "Rarely has so great an accomplishment been so widely ignored."

The skeptical response to the new unified theory of Weinberg and Salam came largely from their own colleagues, other theoretical physicists. The reason has to do with a highly technical disease that was plaguing quantum theory. Ever since the invention of relativistic quantum theory in the 1940s, physicists have known that the theory had some bizarre properties. When you used the theory to perform calculations, the results sometimes would turn out to be "infinite." A very intricate mathematical procedure called "renormalization" was invented to eliminate the so-called infinities from the theory. This technique worked incredibly well for any calculations of the electromagnetic force. Calculations could be performed to any number of decimal places and they agreed perfectly with experimental data. So all theoretical physicists believed that any new theory of the nuclear forces also could have its diseases cured by the "renormalization" technique.

The Weinberg-Salam-Glashow unified theory is a relativistic quantum theory. The theory also has its own "infinities," but no one was able to prove that the infinities could be eliminated by the "renormalization" technique. Even worse, the old theory of the weak nuclear force—before Weinberg, Salam, and Glashow—had diseases so severe that they could not be cured by any known technique. And many pieces of the old theory were built into the new unified theory. Since it was difficult to believe that the new unified theory was any freer of disease than the old theory, both the Weinberg-Salam-Glashow theory and gauge theory in general were forgotten once again.

But gauge theory was reborn four years later. In 1971 a brilliant young graduate student at the University of Utrecht in the Netherlands, Gerard t'Hooft, invented a new mathematical technique for proving that the Weinberg-Salam-Glashow unified theory really was free of "infinities." The key was the unification of the electromagnetic and weak nuclear forces.

Due to some strange quirk of nature, the weak nuclear force cannot exist by itself. The "infinities" in the quantum

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theory of electromagnetism alone can be eliminated by the "renormalization" technique, but not those of the weak nuclear force. The weak nuclear force needs the help of electromagnetism to cure its diseases. That's why the "infinities" could not be purged from the earlier theory of the weak nuclear force alone. This demonstration of the symbiotic relation of the electromagnetic and weak nuclear forces gave new life to gauge theory.

At this point, the experimental physicists got into the act and scrambled to be the first either to confirm or shoot down the Weinberg-Salam-Glashow theory. The sweepstakes was won in 1973 by a consortium of physicists from Belgium, England, France, Germany and Italy, who were working at CERN, the European center for nuclear research in Geneva, Switzerland. The CERN group found evidence that the electron and the neutrino could collide and bounce off each other like a pair of billiard balls. What's so remarkable about that? Before the Weinberg-Salam-Glashow theory, everyone believed that the charges carried by the electron and neutrino were so different that the two particles should be invisible to each other. And the neutrino tends to be so unsociable anyway that it can zip through the earth without noticing it.

So how do you observe neutrinos bouncing off electrons? One way is to use the great accelerator in the sky as a source of neutrinos. But that can take too long when you are searching for something so rare that it has never been seen. Instead, the physicists at CERN constructed a beam that could produce intense bursts of neutrinos. The collisions between the neutrinos and electrons took place inside a giant tank of liquid freon, called a "bubble chamber." The bubble chamber was christened "Gargamelle." If a neutrino managed to hit an electron, the struck electron would leave a tell-tale track of bubbles like the vapor trail of a 747 in the stratosphere. Each time a burst of neutrinos was sent through the bubble chamber, a photograph was taken. More than a million billion neutrinos passed through Gargamelle and over 700,000 photographs were taken. Each photograph was carefully examined and most were empty, but one—just one!—collision of a neutrino and an electron was found.

After the CERN discovery, more experimental results began to come in from laboratories all over the world confirming the truth of Weinberg, Salam, and Glashow. Even the atomic scientists got involved. They detected a tiny effect (one part in a million) in the optical spectrum of excited bismuth atoms which was predicted by the new gauge theory. In 1979 the Nobel committee decided that the evidence was sufficient. They awarded the Nobel prize in physics to Weinberg, Salam, and Glashow.

The testing of the Weinberg-Salam-Glashow theory is now a growth industry in high-energy particle physics. The pace is so hectic that even the practitioners have a hard time keeping up. When I submitted the first draft of this article to the friendly editor of *Analog*, I wrote the following paragraph.

"Another race is on to find two new exotic particles—known as the "W and

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Neutrino-electron collision in Gargamelle bubble chamber.

Arrow shows direction of neutrino as it enters the chamber. The electron which is struck creates a shower of electron-positron pairs which are curved by the magnetic field in the bubble chamber.

Z bosons''—which should confirm the new unified gauge theory against all doubts. The W and Z bosons are the cousins of the photon. In quantum theory, the energy in a field like the electromagnetic field is carried by tiny wave packets called quanta. The W and Z

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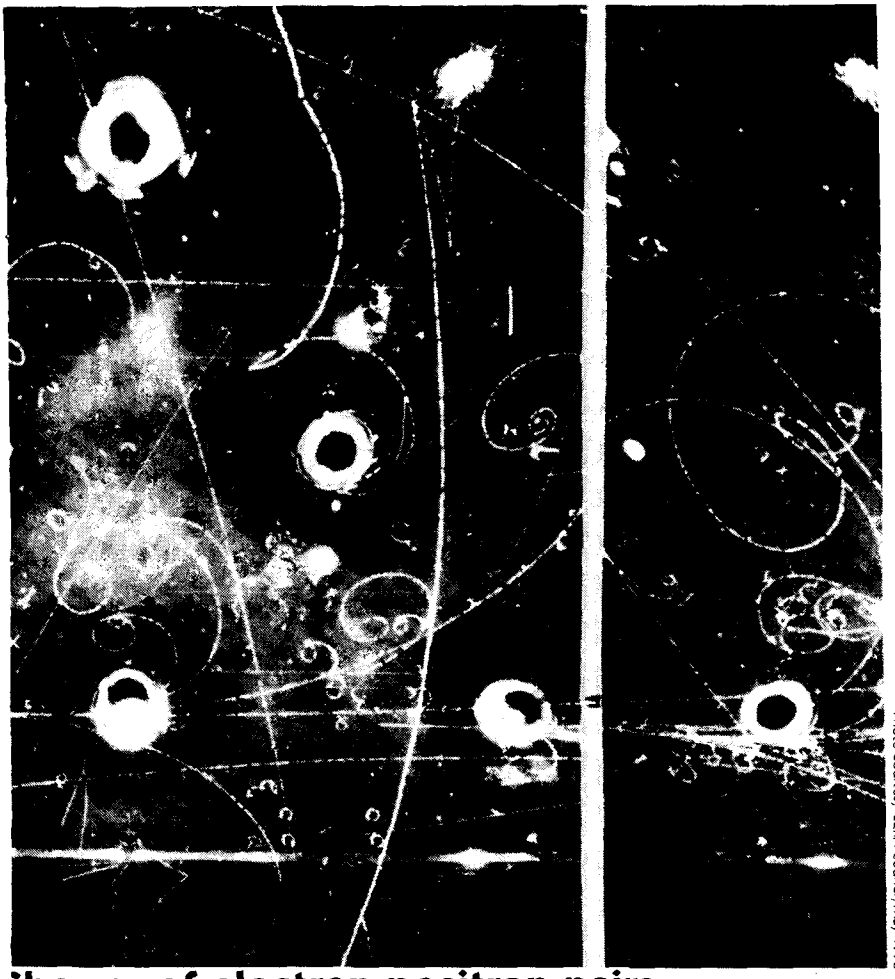

Photo courtesy CERN Courier, May 1978

Shower of electron-positron pairs

bosons are the quanta of the weak nuclear force field. They act like photons except that they are much much heavier. The Weinberg-Salam-Glashow theory predicts that the W and Z bosons are nearly a hundred times as heavy as the proton. That's equivalent to having the mass of a krypton atom all in a single quantum of energy! That's why they have never been seen before. Until a few years ago, no accelerator in the world could produce anything that heavy. Now there are four accelerators in various stages of design or construction

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which will be dedicated to the hunting of the W and Z bosons. One accelerator at CERN is already working, causing much tearing of hair and moaning in the U.S.A. that the Europeans will beat us out. Given any kind of luck at all, there should be an announcement in the New York *Times* later this year that the W or Z boson has been sighted at CERN."

You can guess what happened. Before the editor read my "final" draft, the New York *Times* published the discovery of the W-boson at CERN! So did *Time* and *Newsweek*. The finding of the W-boson resembles a mini-Manhattan Project and shows you just how "big" physics has become. First the giant accelerator at CERN, which used to produce only beams of high-energy protons, had to be re-engineered so that it now contains both protons and anti-protons, circulating simultaneously in opposite directions. When a proton and an anti-proton collide head-on, they annihilate each other and produce huge numbers of particles and—it is hoped—some W-bosons as well. The kind of apparatus that you need to detect and measure the W-bosons is so large and so expensive (millions of dollars!) that it required a team of more than a hundred physicists from half a dozen countries. Nevertheless, the whole thing worked like a fine Swiss watch. After sorting through the debris from one billion collisions, two independent teams of physicists at CERN announced that they had found the W-boson. The first batch consisted only of nine W-bosons, so further confirmation is necessary. But already there are rumors of Nobel prizes in the air.

* * *

The Colors of the Vacuum

Now let me get back to the problem of the strong nuclear force and why quarks are extremely shy.

The facts are not all in yet, but it looks as if nature took a left turn somewhere and decided to make the strong nuclear force even more exotic than we could have dreamed. The best-looking candidate for a new theory of the strong nuclear force is based on a new kind of charge called "color." Color charge comes in three varieties—called red, green, and blue—and can be seen only by the quarks. The color nuclear field is supposed to be a long-range field like electromagnetism. The quanta of the color nuclear field are called "gluons" and the whole theory is a new gauge theory called "chromodynamics."

Color is "hidden." If you have three quarks, one of each color, the total color is white, which is colorless. Neutrons and protons are constructed of three quarks, so they have no visible color either. Then how do you bind neutrons and protons together in the atomic nucleus if their color charges are invisible? If you get close enough to a neutron or proton, you can see the individual quarks and the different colors between the cracks. That's why the strong nuclear force only operates at very short range between neutrons and protons.

A single colored quark has never been observed. Why is that? Remember the decay of the neutron? Somehow the color force is so strong or so bizarre that it keeps quarks imprisoned. How can that be? The answer seems to be that the color force "polarizes the vacuum."

I said bizarre, right? Just trust me.

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Imagine a single electron floating in empty space. The electric field of the electron will attract any nearby positive charges and repel any negative charges. The positive charges move closer to the electron, the negative charges are pushed away, and the local neighborhood is "polarized." Just like politics. Where do the positive and negative charges come from? They come from the "vacuum." In quantum theory, you can literally create electrons and positrons from the vacuum if the electric field is strong enough. That's what Einstein meant when he said energy and matter are interchangeable. So what happens to the electron? It is hidden behind a cloud of positrons. The electron is shielded so that it looks as if the charge is smaller than it really is.

Now apply the same argument to a single colored quark. The color nuclear force field creates pairs of colored quarks and antiquarks and polarizes the vacuum around the original quark. So far that's just like the electron. But there is a very tricky complication. Gluons also carry color charge. Remember, the gluon is the cousin of the photon. But photons don't carry electric charge, so they are not involved in the polarization of the vacuum. Gluons do carry color charge, but they produce an "anti-polarization." And gluons are much easier to produce from the vacuum than quarks. Thus the anti-polarization is stronger than the regular polarization and cancels it. Instead of shielding the color charge of the quark, the gluons make the quark's charge look as if it has increased in strength.

Now what happens when you try to pull a quark out of a proton? As you pull harder, the color nuclear force field stretches. Quarks, antiquarks, and gluons start popping out of the vacuum. The anti-polarization becomes stronger and the quark's charge increases. That makes the binding force between the quarks even stronger. Eventually something has to give. What gives is the field. The tension in the color field reaches a breaking point and the field line snaps. But a field line can't just end in empty space. It has to end up on a charge. The charges are created out of the vacuum. Each end of the broken field line now has a new colored quark or antiquark attached to it. So when you try to pull a quark out of a proton, it comes flying out trailing a new antiquark on the end of a color field line. But an antiquark has the opposite color of a quark. And a quark plus an antiquark is colorless. In fact, a quark bound to an antiquark happens to be a particle called a "meson"—which is very common indeed. When you smash two protons together at high energies, lots of mesons come flying out, but no single quarks.

According to this scenario, single quarks never will be seen—ever! This is a truly bizarre departure from all of our past experience. We have always believed that matter could be broken down into its ultimate constituents, given a big enough hammer. Could the theory be wrong? No one has seen any quarks, right? Well—maybe. For several years William Fairbank at Stanford has been reporting evidence of something with fractional electric charge. The problem is that no one else has yet confirmed his discovery using different

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techniques. Since physicists, very rightly, are highly conservative, someone else has to find quarks somewhere other than Stanford before they can be believed.

Curiouser and Curiouser

At this point you should be asking why again. Not why are the forces different, but why are there so many different kinds of exotic charges? We started with just the electric charge. Then we added the weak nuclear charge—isotopic spin—which is different for the proton and neutron. Finally, we invented three new color charges for the strong nuclear force. The number of new charges is now greater than the number of original forces. Is that really progress?

The situation is not as bad as it might look. All of the charges belong to the same kind of theory—a gauge theory. So the next step is obviously to combine the charges together into a super unified gauge theory. Just make the charges into components of a single super charge, and do the same to all the force fields. Simple, right? Well, maybe not quite so simple. This happens to be where we are right now. And we physicists are sort of spinning our wheels. The problem is that we can think up lots of intriguing scenarios about the ultimate Grand Unified Theory. But there are too many possibilities and not enough facts. So far no one knows how to tell which theory is the right one.

A typical scenario goes like this. The first step is the Big Bang—when the universe was created out of the cosmic egg. The temperature was truly fantastic: a one followed by fifteen or sixteen zeros. There was only one super unified force field and one kind of universal matter. The force field was long range. There was no ether.

The universe started to expand. As it expanded, it cooled. One component of the universal matter began to "freeze" like ice. It became the new ether and filled the universe. A piece of the unified force field suddenly had a very short range. Eventually the temperature fell to a few degrees Kelvin, where it is now. According to this scenario, there really is an ultimate Grand Unified Force Field, but it existed billions of years ago. What we see today are the frozen remnants of that field.

The problem with this scenario is the immense range of temperatures involved from the Big Bang to the present. Is it reasonable to assume that the new ether and the different forces we see today are the complete story? What if there were several stages of "freezing," one after the other, each one forming a different kind of ether? There might be new kinds of forces with ranges so short that we haven't even detected them yet.

Physicists have split into two camps over this issue. One group believes that the forces and kinds of matter we see today were formed very early and nothing much happened since. Thus there is a vast energy gap between the Big Bang and today. Once we reach the edge of this energy "desert," there will be nothing more to do. After all, there is no source of energy big enough that will allow us to study the Big Bang in the laboratory. The other more optimistic group believes that new unknown phe-

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nomena will be discovered as we push into higher but still accessible energy regions. This belief is based on the historical certainty that nature always has more surprises in store for us. ■

ABOUT THE AUTHOR

Kei Moriyasu followed the traditional academic trail from M.I.T. to Berkeley, then spent a postdoctoral year in Europe, mostly in Italy. After three years at the Stanford Linear Accelerator Center, he went to the physics department at the University of Washington, where he is a research scientist. His first book, on gauge theory, was due for publication in the summer of 1983. When not working, he hunts wild mushrooms.

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● I believe that if we really want human brotherhood to spread and increase until it makes life safe and sane, we must also be certain that there is no one true faith or path by which it may spread. But it is not easy to banish the notion that there can be universal brotherhood just as soon as everybody gives up his faith and accepts ours. That day may never come, for the richness of human diversity cannot be abolished any more than Mars or Jupiter. Difference is the nature of life, it is part of our moral Universe. Without difference, life would become lifeless.

Adlai E. Stevenson, *This I Believe*

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It appeared on Morgan's desk the second day of school: a vile-smelling gelatinous gray mound the size of a softball, slimy—like everything, it seemed to her, on this swamp of a planet—and vibrating obscenely. She conquered her shudder *(tact, tact,* the indoctrination tapes had stressed, *don't display aversion, whatever you may find strange),* managed a faint smile, and peered closer. The movement, she saw, was caused by a mass of wriggling white maggots.

Tact be damned! Morgan choked and ran for the door. Gulps of cool air and a facewash in the misty rain finally settled her rebellious stomach, but her nerves remained raw. Friendly and docile, were they, these children of Parth? Obedient and eager to please? So she'd been promised, for her first assignment, but it appeared she'd been duped. Two days into the job and already she'd been patted and poked by slimy scaled hands, her hair had been pulled almost out by the roots, her clothing had been ripped, and she'd given up trying to keep them in their seats. And now they had succeeded in making her lose control completely.

She wouldn't allow them the satisfaction, though, of knowing how undone she was. Morgan wiped her face and straightened her shoulders. She had dressed for combat today, in sturdy khaki that couldn't be torn, and her hair was neatly secured in a braid. If only she felt as tough and competent as she looked, she thought. But she'd brave it out—she had to, for what threatened to be a make-or-break year.

She had suspected something fishy, when she had been rushed with such

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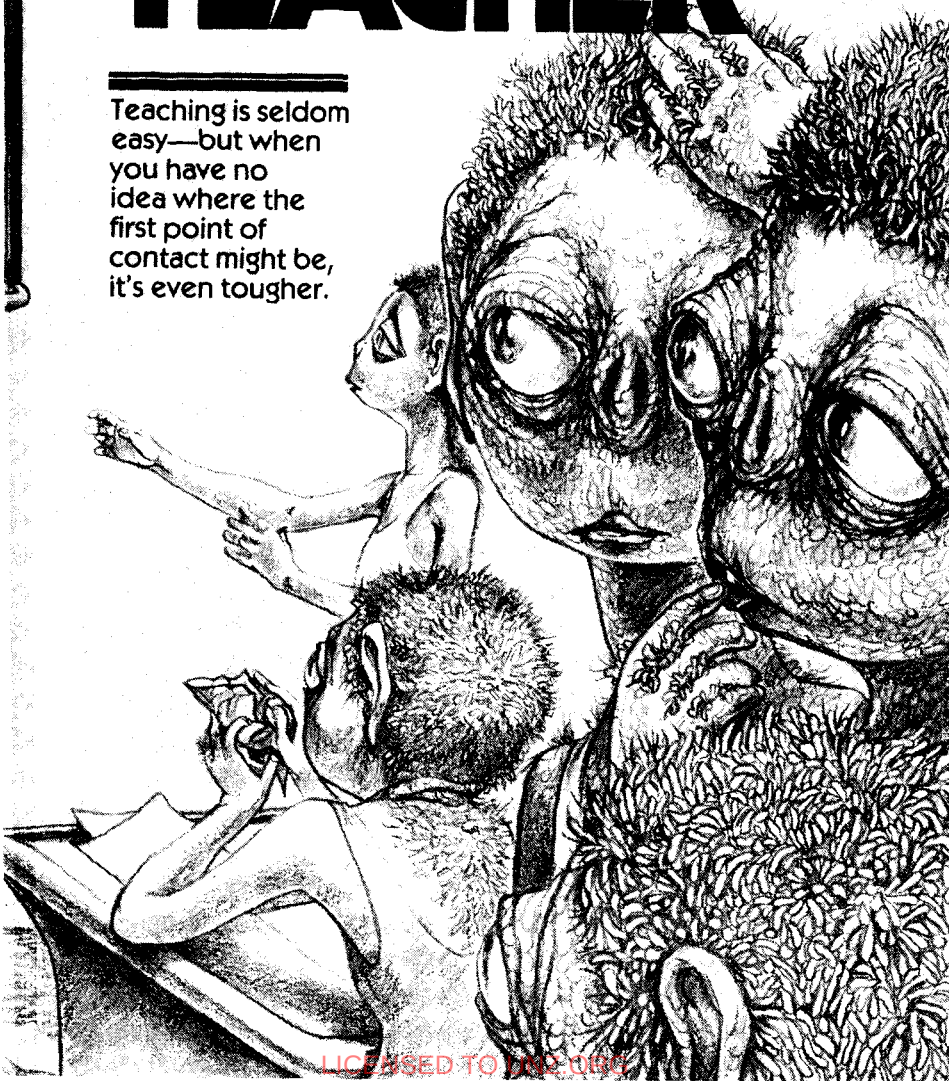
A THRRUP FOR TEACHER

Mary Caraker

Teaching is seldom easy—but when you have no idea where the first point of contact might be, it's even tougher.



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haste to Parth as soon as she had completed her language training. Then it had been straight to the school, with no proper indoctrination; only the tapes and the scant information supplied by her supervisor, Captain Kraskolin, when he had settled her in. The teacher before her had left unexpectedly—"flew the coop," she had heard at the spaceport—and the captain had confirmed it.

"The kind of irresponsible behavior that gives the Corps a bad name," he had said, eying her uneasily as if searching for symptoms of similar flightiness.

She had assured him of her intention to fulfill her contract, and he had relaxed. Space Exploratory Forces needed their toehold on Parth for strategic reasons, he had explained, and the Parthians had to be kept happy. The Space Corps, teaching arm of SEF, established native schools only when they were requested, and after years of insularity from their bizarre but well-paying guests the Parthians suddenly *wanted* their children to learn Terran. "So they can monitor us, in the future," Kras had said pointedly.

"Don't they trust us?" Morgan had asked.

"Would you?" His mouth had twisted into a wry smile. "They may be uncivilized by our standards, but they're no dummies. SEF has really put the Corps on the spot. If we don't satisfy the Parthian Council of Elders—pfft! Out we all go, schools and base and maybe even the port."

"So how many schools do we have here now?"

"Half a dozen, including this one. But so far"—running a hand through his shock of damp curls—"we haven't had any breakthrough. The other teachers are all experienced, and God knows they're trying. That's why we particularly wanted a young, fresh teacher here. Your predecessor, Mr. Tiptin—well, the less said about him the better. He's the reason I've instituted a three-week trial period."

"To check up on me?" She hadn't been able to disguise her disappointment; she had thought herself through with probation. Her second thought had been no more comforting. "Or to see if I'm still here?"

He had smiled. "To offer you what help I can. I'm new to Parth myself, but anything I can do . . ."

It had been Morgan's turn to thaw. The captain was tall and lean and neatly bearded, with the warmest brown eyes she had seen under any sun. He had spent a whole day getting her squared away, providing her with the tapes, with friendly advice and a great deal of encouragement.

But still she had been unprepared. For unhuman squeaks and grasping hands and worm-ridden lumps.

The class was quiet when she re-entered the hut, and the nasty object was gone. There would be no point in trying to find the culprit, she decided. Far from being able to recognize guilt, she couldn't even distinguish yet between the faces.

Twenty expressionless ciphers stared up at her. Twenty identical pairs of protruding, heavy-lidded eyes, twenty flat slitted noses and chinless jaws. Gray scaly skin and mustard-colored hair that grew like a fungus down their necks and backs and even between their fingers and toes. They smelled of fungus,

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too—a musty odor, like a decaying swamp, that pervaded the room.

Morgan straightened again and stared back with what she hoped was dignity. Yesterday she had started out informally, with disastrous results. "Good morning," she said in careful Parthian. "I am happy to see you all again. Let us proceed with the lesson."

A small boy in the first row slid down in his seat and rested his feet on the desk top, a position in which his genitals, beneath the short fringed skirt, were distressingly visible to Morgan. Several others adopted similar positions or slid out completely to squat on the floor. The nose and head picking began.

Morgan summoned up the tape: *Remember, your sole function is to teach them Terran. Forget about manners and mores. They have requested language teachers, so stick to that or you may do the Corps irreparable harm.*

Okay, she would ignore the manners. Probably to them picking and feeling were perfectly acceptable behavior for kids. She got out the picture cards. "Mother," she said, holding up the sketch of a Parthian woman with children. *Ranillin*, she repeated in Parthian, to be sure they made the connection.

The children struggled with the sounds. Giggles and touchy-feely interrupted the lesson, but Morgan stubbornly continued to drill them. She concentrated on smaller groups, whenever she could get their attention, but to little avail. By the end of the hour the children still could not say, recognizably, a single Terran word. Morgan was exhausted and the room was a chaos of disarranged desks and squirming small bodies.

She didn't understand it. Donald Tiptin had been teaching them phonics, according to his notes. The children should have learned at least the basic sounds. "How many of you were in school before, with Mr. Tiptin?" she asked in Parthian.

"Tlip-tlin!" The children pounded on the desks and collapsed hysterically in the aisles.

That was one name she'd never mention again, Morgan vowed. She consulted her records and saw that most of her students had been in Tiptin's class. They must have learned something besides a garbled version of his name.

But when she tried the phonics she got no response. It was time for recess, she decided, and herded the children outside. She straightened the furniture and swept up the mud they had tracked in, then set out pencils and paper for a writing lesson.

Morgan liked a tidy classroom. Teaching had appealed to her as an orderly profession where she could do useful work in a pleasant, structured setting. But the only openings had turned out to be in the Space Corps, and this particular setting was about as unstructured as she could imagine. And as for the work—if the first two days were any indication, she would have only failure to show when Captain Kraskolin came by for his inspection.

She sighed, and distributed crayons in brightly decorated cans. She tacked up model letters on a display board, refusing to think of yesterday and the disgusting uses to which her precious supplies had been put.

She watched the children from the doorway of her stilted hut as they played happily in the rain—laughing piebald

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figures scampering lightly over the soggy field into which, earlier that morning out for her exercise, she had squished awkwardly. Parth was a rain planet, a water planet, its marshes and spreading dark forests nourished by the steady precipitation—torrential in winter and now, in the summer months, an almost constant light drizzle which the children seemed not to notice.

At the edge of the clearing they raced around and beneath the fern-like trees, swinging on the ropy lichen that bearded the twining purple fronds. From a distance they looked like the children she had imagined and expected; like the innocent creatures she had been prepared to love.

She had listened, unconvinced, to the Corps lectures on culture shock. Kids were the same everywhere, she had told herself, finding something cute in all the slides, even the baby Rogans with their fangs and claws. The Parthians had actually seemed among the most "human" of the alien sapients. But that had been from a safe distance. She hadn't seen the fungus or the scales or smelled that rank odor of decay.

Or felt their prying, inquisitive fingers, she thought later. She had summoned them inside and forgotten to station herself safely behind the barricade of her desk. They rushed upon her, chirping and trilling and clicking in excited talk punctuated by the continual, ceaseless poking and pressing. A dozen hands grabbed hers.

"Did you see me swing? I was higher than Gvran."

"Yes, but you fell. Teacher, my arms are stronger. Feel."

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"When can we eat? Feel my stomach empty."

"Why does your skin feel dry and smooth? Where is your hair behind?"

A cold raspy hand reached up her back beneath her shirt. The odor was suffocating. "Cut it out! Get back!" she shouted in Terran, then in Parthian. She pushed away the hands.

Morgan didn't stop shaking until they were all safely seated in orderly rows. Then she steadied herself by concentrating on the lesson. She carefully patterned for them the letter "A."

Papers tore as the small hands gripped their pencils awkwardly and pressed too hard. Again she was surprised at how little they knew—she would have to teach them to hold a pencil. Fighting against her aversion, she opened the moss-furred fingers and guided the scaly hands in their first motions.

The children quickly mastered the pencils, but the letters defeated them. They screwed up their faces into frightening grimaces while filling their papers with squiggles. And before she could gather the papers, remembering yesterday's fiasco, they ended up torn and crumpled and chewed into gummy wads.

It wasn't quite time for lunch break, but she excused them early. She had to air out the hut before she herself could think of eating.

In her cubbyhole of a studio behind the classroom she ate a cold meal straight from the packets. The tapes again echoed: *A big plus, if you can tolerate the native diet.* Sure I can, she had thought; as long as it's safe. But the grubs, the moulds, the stringy waterweeds?

The children were back much too soon, smelling even stronger of whatever unlikely concoction they'd had for lunch. Morgan had moved the desks aside and put out toys on the floor for the afternoon session. She couldn't push her class too hard, she had decided, or she might lose them all. In the morning there had already been two less than yesterday, and now when she counted again there were only eigthteen.

What stories had they told their parents, she wondered? Maybe she wouldn't even have a class in three weeks. Tiptin, at least, had held on to his students.

The children bent busily over puzzles and pegboards, adeptly fitting shapes into holes and linking slotted blocks into elaborate structures. Morgan squatted beside a spindly-legged girl who was playing with an abacus and guided the child's hand to arrange the beads into groups of two, then four. The Parthian understood immediately and correctly worked further additions.

Maybe it was a handle to teach them language! Hopeful for the first time, Morgan fetched a small slate (no more wasting paper, she had decided), and chalked in the number two. "Two, two," she repeated, signalling the child to repeat.

"*Thrrk,*" the small girl trilled and clicked in Parthian. She demolished the chalk and blew dust in Morgan's face, then turned back to the abacus.

Morgan walked away, her face burning. She would have shaken a Terran child and set him in a corner. Sent home a note. But here—she didn't even know if the girl had meant to be rude. No one else paid much attention to the incident; their fingers were as busy, their faces as unreadable as ever.

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* * *

The remainder of the week was just as bad. Morgan made no progress teaching either spoken language or letters. She had to conclude that the children were simply being stubborn—there was no reason why they couldn't learn Terran. Granted, it was vastly different from Parthian, but Morgan had mastered the tongue-trills and rolls and guttural clicks, and there was no physical barrier to the children's pronouncing Terran vowels and consonants.

But they wouldn't try, just as they refused to copy the alphabet. Afternoon play was the only activity that interested them at all, and the only reason, she suspected, why they continued to come.

Certainly not because of her. She had pushed them away too often, and they no longer crowded around her, reached prying fingers or asked her to "Feel my stomach." As a teacher, a friend or even a curiosity, she was totally ignored. She should have been relieved, hating as she did their touch; but instead, perversely, she felt rejected, which added to her growing sense of defeat.

She had been warned about the loneliness, but it got to her more than she had expected. She had only one human visitor the entire week. Dawes the trader arrived on an afternoon after school—fat-bellied, red-eyed space flotsam whom she would ordinarily have despised. She welcomed him like a brother.

He came crashing through the forest in a landsled, gouging huge muddy tracks across the field and up to her door. After he unloaded a plexicrate of supplies he sprawled at her desk.

"So why've they stuck a doll like you out here in the boonies? That gimp that was here before, sure, but you—what a waste! Claws of a Rogan, there's nothing out here but *kiri*-trees and swamp. And shit-furred monkey-men!"

He laughed uproariously at his idea of a joke, and Morgan smiled thinly. Traders were godsends in isolated areas, but she wished he could have been someone more . . . personable.

"But what're you doing out here?" he repeated. "Bothrup's not much of a burg, but at least it's got streets and houses and a coupla bars. And humans. Why can't you teach over there?"

"This is where the children are, not in the towns," she explained patiently. "The Corps has a half dozen teachers on Parth, and they're all in rural areas like this. The Parthians built their schools where *they* wanted them."

"Tough for you, eh, Chickie?" He leered, a parody of a smile. "I've seen some of the other warhorses the Corps sent, and I wouldn't feel sorry for *them*. But you—it's a damn waste of talent."

"So how long have you been out here?" she asked, to get his attention away from her. "Do you eventually get used to the rain?"

He snorted. "In a Rogan's eye! I've been here five years, and I'd give up five more to get off. But every time I try to save up the credits . . ." He swigged from an imaginary bottle and winked. "Hell, it's the only thing that keeps me going on this waterlogged pisspot of a planet."

She managed another strained smile. Dawes could be a useful source of information. "It's wet, I'll grant you that," she said. "Tell me: how do you get along with the natives?"

"By holding my nose!" He roared

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again, slapping his oilskin-covered thigh. "Took me two years just to savvy the lingo, and that's always been easy for me. But I couldn't get close enough to talk to them—know what I mean?" He squinted around the small closed classroom, and sniffed. "Sure you do—I can still smell it in here. It's what they eat, I think—you seen their food?"

"Some of it." She remembered the wormy lump that had been her first present, and described it. "Was that supposed to scare me, or should I have thanked someone?"

He grinned. "Lady, you got the prize. I mean, that's a *thrrup*—a sort of a well-aged mushroom. It's like an ice cream cone to them kids—best thing they could give you. You must sure rate with them."

Not any more, she thought. She suddenly felt cross and depressed, and wished he would leave. She served the obligatory cup of coffee and listened to his further fulminations against the planet and its monkey-men and the general way life had treated him.

"You must get pretty lonely out here, eh?" He was becoming personal again.

"No, I don't," she said firmly.

He ignored her rebuff. "Now, I don't hafta rush right off. I could spend the night—even stay a coupla days. How'd that suit ya?" He grabbed her chin and pulled her face towards him. The hairs in his nose were stiff and black.

She twisted free. She wasn't really frightened—one bad report from her and he would lose his license, and he knew it. "Watch it," she warned. "I said no!" If he persisted, or got rough, she had her finger-needle. She ran her tumb lightly over the release.

He backed off. "Now don't get uppity. I only meant, if you felt like it. Me, I can get it any time in Bothrup."

"Never seen a Space Corps dame yet wasn't a block of ice," he mumbled, getting up.

To you, maybe. She said it to herself. To him she spoke civil goodbyes and gave a large new order; she couldn't afford to make an enemy.

She saw him off with relief. Dawes must know she was just a probationer, she thought; if she won her spurs and remained, he would never dare try anything again.

If she remained. At the moment it seemed a remote possibility. Morgan paced the *kiri*-floored room until she became claustrophobic, then pulled on boots and a slicker and climbed down the ladder to tramp the clearing.

The spongy mire discouraged her before she had made a complete circuit, and she headed for the trees and firmer ground. In the forest the carpet of humus made an easier footing, but the crawling vines and trailing rope-fingers fought her and dripped on her until she turned back in sodden defeat.

There was nowhere to go, anyway. Bothrup was a day's hike, with no trail. Parthian homesteads were scattered in the forest, but even if she had wanted to visit, courtesy forbade her to invade their privacy without an invitation.

And there would be none, she knew, unless she somehow reversed whatever it was she was doing wrong. The Parthians expected the schools to succeed, and she didn't know how patient they were. Somehow she had to get through to those baffling children.

* * *

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During the one-day break (a concession to Terran customs; the Parthians observed no weekends), Morgan reviewed her library of tapes and slides for clues. The information was all familiar: *The Parthian children are allowed a great deal of freedom.* That, she knew! *They are curious and outgoing until puberty, when they become reticent and fiercely protective of their privacy.*

Okay, they had to be reached early. But how? She studied more material —their homes, their economy, their social and tribal structures—but none of it seemed pertinent to her problem. Donald Tiptin's ill-kept records were no help either. "Continue with drills and seat-work *if you can*," he had written, before he had fled. Apparently he had let the children do pretty much as they pleased.

And she had inherited his mess. However, she was grimly determined not to give up. Besides her own pride, there was Captain Kraskolin, who had been so kind and supportive that she couldn't bear to confront him with her failure.

Kind, yes—but she admitted to herself that it was more than that. Those eyes . . . "I really hope you'll change our luck," Kras had said. She had probably read too much into his smile, but living as she did in isolation she couldn't help daydreaming.

Only two more weeks—to prove herself or have the captain pack her out again, a financial loss to the Corps and a burden to the Terran settlement until the next Earthside rocket came. "God knows they're trying," he had said of the other teachers. He would probably think she wasn't. Another Tiptin, he would most likely consider her. Perhaps he would assign her to one of the other schools, an unwanted assistant.

The day stretched long, and Morgan sought refuge in housework. The Parthians had provided her with luxuries —like heat and running water—that must have seemed laughable to them. She scraped fungus from her shower and from the recesses of her storage bins. She washed her clothes and strung them to dry across the schoolroom, firing her stove to aid the process. She routed split-tailed crawlers from behind the corner-beams, but gave up when she saw that they were inaccessibly established in the roof thatch. As long as they didn't come out . . .

She took down her wash and scrubbed her floor until the *kiri*-swirls gleamed. She polished the desks and arranged them in geometric precision. The room shone. It proclaimed order and industry, and she felt a proud sense of accomplishment.

Discipline. That was the key, she thought. *Control.* Concepts foreign to the Parthian children. She had been too soft, too timid, letting them dictate to her. Another Tiptin. The children *could* learn, if only they would stop their incessant play and focus their minds.

It was her answer. She had to teach them to concentrate, and that meant sitting still, much as they seemed to hate it. The desks would stay in their positions, the children would stay at the desks, and the hands would stay on the desktops. There would be no feely games during classtime, and it had nothing to do with mores—only with doing her job as a teacher.

* * *

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It wasn't easy, but Morgan persevered in her role of stern-faced martinet. By lunch break the next day she had fifteen subdued little figures sitting bolt upright, hands on desks and eyes fixed reproachfully on hers.

At last she had their complete attention. She held up the familiar picture. "Mah-ther," she pronounced slowly for the hundredth time.

And received absolutely no response.

She made an inspiring little speech about industry and success and how they could all say the words if they would only listen to her and try.

The children wriggled uncomfortably, and the smallest ones swallowed hiccups that sounded suspiciously like sobs.

Morgan tried a few more words, but received only hostile stares. She excused them for lunch.

It would take time, she told herself; at least she had made the first step. The tear-filled eyes of little Skrril troubled her, but she reminded herself that she was here to teach, not to win a popularity contest. And without distractions, Skrril and the others *would* begin to learn.

Unfortunately, Skrril did not return from lunch. Neither did two others. Morgan drilled the remaining twelve children in phonics, but even with such a small class she made no headway. In the writing lesson squiggles still covered the slates.

The next day only ten children appeared. Morgan was well into another one-sided oral lesson when three Parthian adults appeared in the doorway.

They filed in silently and flattened themselves against the rear wall. The children did not blink, and Morgan knew that she must follow suit—it was discourteous of the visitors to invade *her* space, and she would be even ruder to acknowledge them.

She pretended that they were not there and went on with her monologue that should have been a dialogue.

"Good morning." No answer.

"How are you?" Silence.

"Fine, thank you. My name is Mary—what is yours? My name is John, my name is . . ." She rattled on without pausing for the missing responses, disconcerted by the silent watchers. They had to be really concerned, she knew, to appear unannounced the way they did.

Of course, the children had talked. Complained. The elders had to find out what was going on.

Parthian children are allowed a great deal of freedom. She had probably overstepped completely.

Morgan tried not to look at her visitors, but their image was stamped on her mind: three gaunt figures in leathery fringed skirts nearly to their ankles, motionless as statues but radiating disapproval; the eyes, shielded by the heavy lids, missing nothing.

Demoralized by the silent scrutiny, Morgan ran out of words. She began reading the dictionary until it dropped from her shaking hands. She felt like an idiot.

This was insane, she decided; why couldn't she simply find out what they wanted? She looked at the men directly and started toward the back of the room. "How may I help you?" she asked in Parthian.

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The three visitors disappeared as quickly and silently as they had entered.

School was short that day. What did it matter, Morgan thought, when it was all so useless? Her authoritarian methods had only made the kids more unreachable, and now it appeared that the Parthians themselves would see to her dismissal even before Captain Kraskolin.

Two children lingered after the rest were gone—Lurrp the chalk-blowing mathematician and Tillin, a sober little boy whose fingers had been particularly adept with the slotted blocks. Lurrp worked her hands nervously as she asked in Parthian trills: "Teacher, will we have play with the finger shapes tomorrow?"

Morgan had not brought out the toys all week, part of her new campaign. Her failed campaign.

Why not? she thought, and was about to answer when Tillin poked an inquisitive finger into the soft flesh of her backside.

She jumped and lashed out angrily, in Parthian: "Stop it! Haven't I told you to keep your hands away from me?"

Tillin's face crumpled (when had she thought the Parthians expressionless?), and he retreated hastily—down the ladder and across the clearing before Morgan could undo her harshness. Lurrp gave her a sorrowful glance and glided out, too.

Morgan gave up all hope when only six children showed up the next day. One of them was Lurrp, but the thin girl looked so sad-mouthed that Morgan wondered why she had bothered to come. The lure of the abacus?

She might as well let them play, she decided, and spilled out the toys.

The children slid joyfully from the stiff chairs. Lurrp claimed the abacus and stroked it lovingly, crooning to herself. When she looked up to meet Morgan's gaze, she held out the toy.

The beads were arranged in groups of two. Lurrp strained, open-mouthed, to form a word.

Morgan knelt beside her, expecting nothing, her mind as woodenly blank as her automatic response. She enunciated slowly, with exaggerated lip movements. "Toooo."

Lurrp reached hesitant fingers to Morgan's mouth and felt the expulsion of air.

The touch was cold and the rank smell of mossy fingers filled Morgan's nostrils. Her every instinct was to slap away the hand, but she could feel the eagerness, the *wanting* in Lurrp, and she did not move. Suddenly overcome by the futility of everything she had done, had tried to do, her defenses crumbled. She was tired of her stiff-backed pose, tired of keeping the children forever at a distance, tired of uselessly protesting.

She repeated the word, and while the fingers explored the position of her lips, her teeth and even her tongue, Morgan knelt frozen in a stasis that was at first unbearable. She felt about to suffocate, to become violently ill. She tried to hold her breath, but the scent of green swamps was overpowering. As she breathed it in and let her tense muscles relax, the nausea passed and she was strangely, unaccountably, free of revulsion.

"Two," the Parthian child said perfectly.

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"Three, four," she repeated after Morgan, her fingers still exploring Morgan's mouth.

Morgan was scarcely aware of it when Lurrp was replaced by another child, and still another. She didn't push them away, and she didn't get sick. Instead, she hardly noticed the smell and the touch for the immense, calm joy that filled her when she realized what was taking place.

The tactile-oriented children, once they could feel the sounds, had no difficulty imitating them. Morgan had put up every barrier, but when she surrendered, the eagerness of her pupils was inexhaustible. "Mother. Father. Tree, Water. What is your name?" The lessons over which she had laboured so fruitlessly issued like echoes from the small throats.

The written letters were a greater challenge, but again Morgan took her cue from the children. She remembered the gummy paper wads. No need to sacrifice her supplies for papier-mâché, though—not with a yard full of mud.

It was a bigger mess than she could ever have imagined, but after the children had formed an "A" of sloppy clay they didn't forget it. She was halfway through the alphabet when pleas to "feel my stomach empty" reminded her of lunch break.

But they could hardly have had time to eat, Morgan thought when they returned—they must have been too busy spreading the word. Her full complement of twenty-two students filled the room, all rambunctiously eager to catch up with their six lucky playmates. Morgan assigned the six as her aides, and the others learned from them.

At the end of the day Morgan ruefully surveyed her ruin of a classroom. She would get no points for keeping a trim ship, if Captain Kraskolin considered that important.

He didn't. Succeeding days unlocked the words that had been stored during Tiptin's bumbling tenure, and by the time Kras came the children had a working vocabulary. Some were even beginning to read.

"However did you do it?" the captain asked in open admiration.

When Morgan told him, he was even more amazed. "I would call that courage well beyond the call of duty. You know—the smell.

"By the way, would you mind if I open the door? It's still pretty strong in here."

"No—go ahead. I guess I forgot." She lied; she didn't smell a thing but fertile swamp; the rich smell of life.

"And God—what's this on your desk? Let me throw it out for you." Kras made a face and gingerly removed her latest *thrrup*.

Morgan smiled. He had a lot to learn about Parth. But then, she had a lot of time to teach him. ■

● No animal should ever jump on the dining room furniture unless absolutely certain he can hold his own in conversation.

Fran Lebowitz

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Jay Kay Klein's biolog

Once upon a time, there were no science fiction magazines. The first —*Amazing Stories*—appeared in 1926; only four years later *Analog* (originally called *Astounding*) arrived on the newsstands. Ziff-Davis Publishing Co., one of the two largest magazine companies at the time, acquired *Amazing* in 1938 and published it for many years, based in Chicago. Leo Summers started there in 1952 as an apprentice artist, later transferring to the New York office as art director. It was the era of downsizing magazines, and Leo's responsibility was to turn the company's pulp science fiction magazine into the familiar digest size we know today.

Leo had studied at Seattle's Burnley School of Art for three years. This was just after World War II, when Leo, like a lot of other veterans, was able to get an education in the field of his choice through the G.I. Bill. (He had enlisted in the Navy directly after high school in Seattle, fighting across the South. Pacific for three years.)

Somewhat older and much more experienced, Leo left Ziff-Davis in the mid-'50s to fight across the world of commercial art. Steely-eyed New York City book, magazine, and advertisting art directors were sometimes not much less troublesome than inflexible Japanese U-boat commanders.

Still, he prospered, doing work for the manufacturers of such well-known products as Kleenex. He produced full-color ads for major movies (like *El Cid*). Quite a finished artist by now, he put together thematic book illustrations; one such project involved a thousand pieces of artwork for a *History of the Arts* published by Bobbs Merrill. Another required a hundred historical illustrations for *Gourmet* magazine's *Old Vienna Cookbook*.

Leo fitted magazine illustration jobs in between major assignments, since like many other artists he liked the freer hand usually allowed by magazine editors. Science fiction especially, he says, encouraged imagination and enterprise on the artist's part.

Analog commissioned many interior black-and-white illustrations, and Leo secured his first of four cover assignments for the June 1969 issue. With the September 1980 issue *Analog* joined Davis Publishing Co., and Leo found he had come full circle. (The Davis of Ziff-Davis was the father of *Analog*'s current president and publisher.) As *Analog* readers know far better than most inhabitants of this planet, it's a small world. ■

Leo Summers

Photo by: Fran Dougnty 1979

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On Gaming

Dana Lombardy

Star Fleet Battles is one of the most popular SF board games, and a new edition has been released ($19.95 at your local store; if there isn't a store near you that has the game, see the address at the end of this review).

The latest version of the game is the result of years of rules variations and feedback from players. Called the "Commander's Edition," it comes with a 96-page rules book; a 19 by 23-inch hexagonal map representing a section of open space; a chart with weapons data and turn gauges; 216 die-cut playing counters; 2 dice; 6 sheets with ship data for 11 different fleets; separate rules and a scenario for use with Task Force Games' *Starline 2200* metal ship miniatures; 22 damage allocation charts; and 4 movement and energy allocation sheets.

Star Fleet Battles is a game of starship conflict between the United Federation of Planets, Klingons, Romulans, Kzinti, Gorns, Tholians, Hydrans, Orion pirates, and various minor races.

Each player commands one or more starships, which he'll use to perform various missions required by the scenario he's playing. There are 18 scenarios, including solitaire games against alien monsters, two-player duels, and multiplayer team-fleet actions.

Star Fleet Battles is a detailed tactical game with each hex on the space map representing an area 10,000 kilometers wide. Each counter represents one starship, such as the Federation Heavy Cruiser (the *Enterprise*), the Klingon *D7 Battlecruiser,* or Romulan *War Eagle.*

The game is relatively complex, but easy to play once you've grasped the main points. A "Cadet's Game" is outlined to faciliate learning how to play. You only need to read about 14 pages of rules in order to begin play.

The rules include lots of details on each race, the conflicts and alliances between them, descriptions of the ships, plus advanced rules covering mutinies, drones, cloaking devices, mine warfare, etc. There are also notes for a campaign game of linking scenarios in which the results of one scenario affect the next scenario to be played. If you believe you've mastered the game, there's a "Captain's Game" of nine scenarios designed to test your abilities as a starship commander, using ships of any race. (As an interesting variation, you can play an alien starship commander, with your own problems and limitations.)

During each turn, you determine the amount of energy available and allocate this power to move, fire your weapons, operate defensive

(continued on page 134)

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The man standing beside Commander Lee Chen was tall and gangling, with the sort of faraway look in his eyes that Captain Harl Roman had always associated with heavy drug use. That drugs were not involved, though, was clear from the orders the man had brought aboard the *Amity* with him; and in a way, Roman thought, that almost made things worse. It meant that that look would likely be with him for the entire trip.

Tossing the orders onto his desk, Roman turned his full attention to the man. "Well, Mr. Demothi," he said. "The orders are quite clear. Suppose you tell me just why you think you'll be able to make contact with our space horse."

Nodin Demothi's expression remained serene. "All the reports should have been transmitted—"

"I've seen them," Roman interrupted. "I want to hear it in your own words."

"Very well." If he was offended, Demothi didn't show it. "I've consistently scored above ninety on the Nowles sensitive test since I was fifteen. I've successfully contacted dolphins and whales, using the same amplifier helmet the Tampies use with space horses."

"Dolphins share a home planet and a great deal of history with man," Roman pointed out. "Space horses are totally alien to us."

Demothi shrugged minutely. "So are the Tampies, but I was able to communicate with several of them during my studies on Traklee-Kyn. They said I showed promise."

Roman pursed his lips tightly and mentally canceled the remainder of his

BÊTE NOIRE

Timothy Zahn

The space horse revolutionized space travel and brought an uneasy peace between two alien intelligences. But any animal must be part of a larger ecosystem—and an ecosystem works by cycles of life and death.

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planned cross-examination. Even such a lukewarm recommendation as that —coming from a race that *could* control space horses—had obviously galvanized someone high up in the government. Finding an excuse now to object to Demothi's presence on his ship would likely be a waste of time. "All right. I suppose we'll find out one way or the other. You ever spent much time on a space ship before?"

"Not more than a few days at a time. That was all on passenger liners, of course."

"Right." Roman pressed a button on his console. "Life here will be somewhat different—more scheduled and less private, for starters. We'll be in free-fall most of the time, too."

Demothi's eyes flicked to the viewport, where the stars were tumbling past in time to *Amity*'s axial rotation, and quickly looked away. "I understand. I can handle it."

"We'll also probably be in deep space for several months," Roman added. There was a tap at the door, and the panel slid open to reveal a young crewman. "The mean time of our four successful calving runs has been ninety-eight days; the longest has been one-twenty-five."

"I understand," Demothi said again.

Privately, Roman conceded defeat. "As long as you know what you're getting into." He gestured to the waiting crewman. "Mr. Kliment will show you to your quarters and help you stow your gear. We'll be staying in Solomon system five hours longer, in case you change your mind."

Demothi ducked his head in an abbreviated bow. "Thank you, Captain. I'll do my best to stay out of everyone's way." Turning, he and Kliment left, the door sliding shut behind them.

Chen cocked an inquisitive eye toward Roman. "A bit short with him, weren't you, skipper?"

Roman picked up the paper Demothi had brought and fed it into his computer terminal for recording and subsequent reclamation. "I don't like having inexperienced ground-huggers on my ship," he said. "Aside from the nuisance, who knows what it'll do to Man o' War?"

Chen smiled. "Come on, you can be more honest than that with *me*. The *Amity*'s never had exactly the same crew twice, and that hasn't seemed to bother the space horses a bit."

"That we can tell," Roman put in.

Chen ignored the qualifier. "What are you *really* worried about? That this guy will succeed and throw the whole political balance to hell?"

Roman shrugged uncomfortably. *The political balance*—a strange sort of term for the enlightened self-interest that was keeping the whole Human-Tampy border from exploding into warfare. With only so many habitable worlds in the region—and with human and Tampy concepts of "development" at precise right angles to each other—the only thing holding the situation below flash point was the tremendous economic potential of *Amity*'s space horse breeding program. "Of course I'm worried," he admitted to Chen. "We were on the brink of war when *Amity* accidentally midwived the first space horse calving, and we *still* don't know what we did right. So, fine—the more horses we can add to the stock, the easier it is to expand

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outward to uncontested worlds. But a major part of the equation is that so far only Tampies can communicate with the horses well enough to control them or even keep them alive in captivity."

"I'm constrained to point out, skipper, that the one fact we've managed to establish is that space horse calving requires a mixed crew on the attending ship. Even if this boy wonder learns how to control them, we'll still have to cooperate with the Tampies."

"I'd like to believe everyone will see it that way," Roman said. "But the frontier disputes have generated a lot of bad feelings . . . and I don't know about the Tampies, but we humans have a long memory for grudges. We can already capture wild space horses reasonably well; if we learn to control them, too, some idiot demagogue might decide the time is right for taking vengeance."

Chen shook his head. "I see your point, but I think you're worrying about nothing. You don't give people enough credit, sometimes." He glanced at his watch and headed for the door. "And speaking of giving people credit, I'd better get to the bridge and make sure the supply loading is still on schedule. See you later."

Five hours later the *Amity*'s preparations were indeed complete; and, on command from its Tampy Handler, the space horse Man o' War pulled the ship out of orbit and headed away from the ecliptic plane at a comfortable point eight gee.

Seen from outside, Roman knew, the panorama was like nothing else in the known universe. The eight-hundred-meter-long cylinder that was Man o' War was a dark gray mass pushing silently through space, rendered visible mainly through the glowing webbing wrapped snugly around it. More strands of the webbing trailed a kilometer behind it, linking the creature to the *Amity* herself and providing the communication link between them. Roman's own view from *Amity*'s bridge wasn't quite as impressive, but other sensory inputs more than made up the lack: to be running nearly a gee of acceleration without the roar of a fusion drive pervading the ship was an experience that still could make Roman's flight instincts flinch.

"Rrin-saa's calling, Captain," Erin Kennedy, at the helm, reported. "He wants to know when we'll want to Jump."

Roman keyed his intercom, and a lopsided face appeared on his screen. Like most humans, Roman couldn't distinguish between Tampy faces; but the yellow-orange tartan neckerchief the alien always wore was sufficient identification. "Rrin-saa, this is Captain Roman."

"Rro-maa, yes?" Rrin-saa's grating voice acknowledged.

"I'd like to maintain our course for another hour or so, both to get us farther out of the dust in Solomon system and also to move us to a higher gravitational potential. NAL 280 is a blue giant, and I'd hate to Jump in too close. Have you located the star yet?"

"Yes. Horse can see it already, too."

So the dust wasn't going to be a problem after all. "Good. Then we'll just get a little more distance, turn Man o' War around to kill some of the velocity we've built up, and go. Call it twenty

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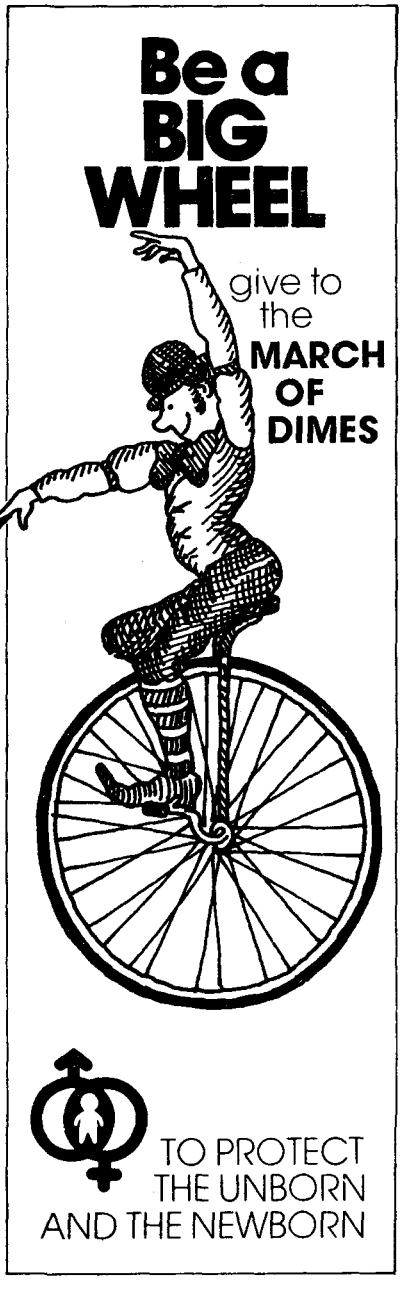

minutes to turnover, sixty to Jump. That satisfactory?"

"Your wishes are ours." Coming from human lips, the words would have been fawning or sarcastic; from a Tampy, it was merely an affirmation of Roman's authority as captain.

"Good. We'll let you know when to have Sso-ngii turn Man o' War around. Out." Roman flipped off the intercom and turned again to contemplate the bridge viewport. *The first expedition to visit NAL 280,* he mused, *and we'll take the entire six hundred light-years in one instantaneous Jump. The whole galaxy's open to you if you've got a space horse.* Small wonder, really, that the creatures had succeeded in holding off an interstellar war.

He just hoped no one in power would decide to get all the golden eggs at once.

The first of *Amity*'s missions some four years previously had ended with the totally unexpected appearance of a space horse calf, a blessed event which had previously never been seen with horses in captivity. Every facet of that voyage had been subsequently analyzed, and the *Amity* had been sent out again with a new horse and instructions for duplicating the conditions of the first trip as closely as was practical. The cookbook approach, Lee Chen had scornfully dubbed it . . . but to the surprise of practically everyone it had worked. Four new ships now toured the stars with mixed human and Tampy crews, and a dozen more were in production. But *Amity* still held the best record—four calvings in six voyages—and so it was *Amity* that had drawn the straw for Nodin Demothi's grand

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field experiment. The price of success, Roman finally decided to consider it.

Not that Demothi was a great deal of trouble. He was, in fact, almost exactly the opposite. Much of his time was spent on the Tampy side of the ship, discussing his upcoming contact attempt with chief Handler Sso-ngii and practicing with the other Handlers via the spare helmet. He returned to the human side only for meals and sleep, and since he often ate in the solitude of his own cabin, Roman could often go days at a time without so much as passing him in a corridor. There was no particular reason Roman could see for the other's self-imposed isolation—certainly his medical file gave no hint of antisocial tendencies—unless he thought that he would stand a better chance of making a successful contact if he stayed as aloof as possible from the other humans. The idea, Roman had to admit, wasn't as ridiculous as it sounded. Not even the Tampies knew the full range or discernment of space horse senses, and if the Handlers had any insight as to what their immense charges thought about the universe in general or humans in particular, they were keeping it a dark secret.

Still, Demothi's space-hermit act was a source of amusement to some of *Amity*'s crew, and Roman was thus not at all disappointed when Man o' War began to show the telltale symptoms a mere sixty-four days into the voyage.

"Definitely sluggish on that last Jump," Second Officer Per Skald told Roman, his fingers dancing across computer keys as he ran comparisons against the data from previous calving runs. "I'd say one more Jump and we'll be ready to deploy the boats."

Roman nodded and gestured to the communications officer. "Inform Mr. Demothi he's to be ready in one hour. Lee, got any good spots picked out?"

Chen had a section of the New Arcturus List on his screen; from his position, Roman could see that several of the stars were highlighted in red. "Let's see . . . well, there's always the biggies like Canopus or Rigel," Chen said. "Lot of space horse traffic goes through those, though." He activated a second screen, checked its numbers. "Here we go, skipper. NAL 11612. Nice little K-type about four light-years away. Couple of gas-giant planets, no bases or known life, completely uninteresting."

"Sounds perfect. Feed the coordinates to the Handler and alert the calving teams to get ready."

An hour and a quarter later Man o' War turned its long axis toward the target star and made its Jump, and within minutes the Tampies informed Roman that the calving process had begun.

"We should have at least a couple of hours before the calf is out, shouldn't we?" Demothi asked Roman as they suited up together in the somewhat crowded number four ready room.

"Easily," Roman told him, listening with half an ear to the dialog between the bridge and the boats now launching from *Amity*'s hangar. "But I want us out there and ready to go the minute the calf is webbed, and I don't want to have to rush."

"I see." Demothi nodded and returned his attention to his suit.

"You *do* understand why we're doing it this way, don't you?" Roman asked,

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struck by an oddly insistent urge to make sure the other realized the long delay hadn't been due to some sort of malicious whim on Roman's part. "Mature space horses can Jump incredible distances and can hit normal space accelerations of better than five gees. If you tried to contact Man o' War and it panicked, there's no telling what it would do to both you and everyone else aboard *Amity*. But a calf—"

"Has extremely limited abilities for the first few hours," Demothi nodded again. "I understand, Captain. I *was* well briefed before I came aboard."

Clamping his jaw tightly, Roman shut up, mentally berating himself for forgetting that Demothi's faraway look didn't mean the man was mentally inoperative.

The rest of the suiting up was accomplished without unnecessary conversation, and after passing the scrutiny of the ready room safety officer the four humans who would be riding the test boat cycled through the lock and into the forward hangar. They reached their assigned lifeboat to find their two Tampy companions already waiting.

"Rro-maa?" Roman's headphone crackled as the humans floated into the boat's combination control/passenger deck.

"Here," Roman said, gesturing to identify himself. "Is that Sso-ngii?"

"Yes." The taller of the Tampies gestured to his companion. "This is Wwis-khaa, who will assist."

"Good." The chief Handler, Roman noted with interest, had made a revealing choice of assistants: Wwis-khaa was the only Handler on the *Amity* who'd had substantial experience with soothing freshly captured space horses out in the wild. If asked, Roman knew, neither Tampy would speculate out loud as to how the new calf might react to Demothi's contact. It was clear, though, that they had no intention of taking chances.

The external-pressure indicator in Roman's helmet winked on, and he turned to see that Skald and co-pilot Connie MacKaig had taken their places and begun the pre-launch procedures. "Atmosphere checks clear, Captain," Skald reported. "Engines, power supplies, and computer read normal. We'll be ready to go in about five minutes."

"Fine." Strapping himself into one of the seats near Skald, Roman popped his helmet and lifted it clear. The air smelled crisp and clean, but that would soon change: the Tampies too were removing their helmets. Drawing the collapsible filter mask from his side pocket, Roman slipped it on.

Humans and Tampies could breathe the same atmosphere, but the odors each species generated were disagreeable to the other, especially in the relatively cramped quarters of a lifeboat. The masks weren't the world's most comfortable, but for the few hours they would be needed they would be tolerable.

Minutes later, Skald eased them out of *Amity*'s hangar and headed up the glowing rein lines toward the patch of starless sky that was Man o' War.

They reached the space horse's curved side to find a stockfloor of activity already in progress. Floodlights from three outlying boats illuminated the area where a hundred-meter-long cylindrical bulge was pushing outward from the

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dark gray skin. Surrounding it, space-suited crewmen were snipping through the tight-fitting web, giving the bulge room to expand. Fifty meters away, two more boats stood by, the shimmer of slack webbing between them. It was to this group that Skald directed their boat, where they would have both a bird's-eye view of the final stages of the calving and would be in position to link up with the brand-new space horse as soon as it was secured.

As yet there wasn't enough data to define a "textbook" space horse calving; but it was Roman's personal opinion that when one was eventually written up Man o' War's would be close to the mark. Two and a half hours after the bulge first appeared the horse's skin abruptly split, opening like a long toothless zipper along the calf's entire hundred-meter length. Seconds later the new horse drifted free, a shiver rippling through its lighter-colored skin the only sign of life. In theory even such a young horse had enough telekinetic strength to play havoc with the web boats, but in practice it had never happened and this time was no exception. The calf floated docilely as the boats completed their capture; swinging in right behind them, Skald caught the bundle of rein lines in his forward grapple. Seated three seats away from Roman, Sso-ngii stiffened and then relaxed as the tiny indicator lights on his multi-wired helmet flicked to green. MacKaig, too, was watching the Tampy, and with a gesture that was very nearly a flourish she threw the general broadcast switch. "Test boat: contact made," she announced.

The faint roar of background cheering came over Roman's headset. "I think we've got a new speed record, skipper," Chen's voice said. "Two hours forty-six minutes twelve seconds. Got what looks like some interesting data from the outriders, too—the underskin was definitely changing from conducting to insulating as the outer skin folded back into place."

"Well, that'll be good news for one side of that argument, anyway," Roman agreed. "How's Man o' War doing?"

"Hhom-jee?" Chen invited.

"He is fine," the Tampy's measured voice cut in. "His recovery is nearly complete, and he shows no sign of trauma or stress."

"Good." One of *Amity*'s previous breeding runs had resulted in what the Handlers had described as "mild stress," and it had taken them half an hour to calm the horse down. "If you'll move back a couple of kilometers, we'll start Mr. Demothi's test run."

"We're moving," Chen reported. "Have you got a name for the calf yet?"

"I thought we'd just go with 'Quentin,' since this is our fifth breeding."

"Not particularly inventive."

"Our files fail to list the original Man o' War's progeny," Roman said, a bit tartly. His concerns about the test, successfully repressed during the past two months, were bubbling to the surface again, and he was in no mood to wrangle over the calf's name.

Chen apparently got the message. "Quentin it is, skipper. All right, we're coming up on two kilometers . . . slowing to zero-vee relative. Any time you're ready."

"Right." Roman turned to Demothi,

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sitting quietly between Sso-ngii and Wwis-khaa, and nodded. "Go ahead."

Without hesitation Demothi took the helmet Sso-ngii handed him and placed it carefully over his head. Eyes on the helmet's indicator lights, Roman clenched his fists tightly, squeezing the gloves together in his lap. His brain had just enough time to register the indicators' abrupt switch to red—

And he was slammed hard into his seat as Quentin bolted.

"Sso-ngii, take over!" he shouted, his body automatically estimating the acceleration at about a gee—the upper limit of a space horse this young. Whatever Demothi had done, Quentin had been pretty badly spooked by it. An instant later the horse changed to a sideways motion, hurling the lifeboat's crew against their safety harnesses. Clamping his jaw tightly to protect his teeth, Roman watched as the two Tampies and Demothi fought to retrieve the helmet as it swayed erratically around them on its supporting cables. Quentin changed direction four more times before Wwis-khaa finally got a firm grip on the helmet and jammed it over his head. The lights and Quentin's run began almost immediately to change, and within a couple of minutes the Tampy pronounced Quentin skittish but under control. It was only then that Skald made the unexpected announcement.

"Captain—the *Amity* is gone!"

"What?" Roman hit the release on his harness and kicked himself into a flat dive for the control area. "Are we still in the 11612 system?" he asked, steadying himself with a hand on Skald's headrest.

"Spectrum matches," the other grunted. "Quentin's supposed to be too young to Jump, anyway."

"Anyone hear anything on the radio?" Roman asked, raising his voice to include Demothi and the Tampies in the question.

The replies were all negative. "We were pretty busy," Skald pointed out, "and I was running the maneuvering jets almost constantly to try and smoothe out the worst of the bumps. A short transmission could easily have been missed in the noise."

"Got it, sir," MacKaig cut in. She tapped the recorder's return button briefly, then switched over from her headphone to the boat's speaker.

Chen's message was indeed short. "Skipper, Man o' War's spooking—they can't hold it! We'll be back—" The voice and hum of *Amity*'s carrier wave cut off simultaneously.

Skald looked up at Roman, a puzzled expression on his face. "Why the hell should Man o' War Jump? It was *Quentin* who was scared."

"Perhaps that fear was communicated to his parent," Sso-ngii suggested from behind them.

MacKaig craned her neck to look at the Tampy. "You mean they're telepathic as well as telekinetic?" she asked.

Sso-ngii gave the short fingers-to-ear gesture that was the Tampy equivalent of a shrug. "What is telepathy? To a space horse the passing of thoughts via sound might so seem. Horses communicate; we do not know how."

"But it doesn't make sense," MacKaig argued. "Why would Man o' War Jump instead of coming to Quentin's aid?"

"Watch out—you're anthropomor-

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phizing now," Skald warned. "You can't expect a space horse to act like a human mother."

"Ppe-skaa is correct," Sso-ngii said, unexpectedly supporting Skald. "Perhaps the horse heard only the calf's fear and Jumped therefore as the calf wished to do. Humans do not, I fear, understand such complete sharing of feelings."

"No, I think the noble Tampy empathy is probably beyond us," Skald said with just the faintest touch of impatience in his voice. "Captain, the screens show the three outriders are still back where we started our little joyride. Shall I set up the comm laser and arrange a rendezvous with them?"

"Might as well," Roman nodded. "Though I doubt if *Amity* will be gone for very long." He studied the screens a moment, figuring distances and fuel requirements. "Still, no point in wasting fuel. Tell them to stay put where they are, and we'll see if we can get Quentin to take us back there."

"Do you think that'll be safe, sir?" MacKaig asked, sounding a bit uncertain.

"If Wwis-khaa can control horses fresh from the wild, I expect he can handle Quentin all right," Roman assured her.

"But Wwis-khaa won't be controlling him," Demothi spoke up suddenly. "*I* will be."

Roman turned in mild surprise; Demothi had been so quiet that he'd almost forgotten the other was there. "Sorry, but I think you've had a fair chance to show what you could do."

"No, I haven't." Demothi's voice was quiet and respectful, but no less stubborn for all that. "It was a new experience, both for me and for Quentin, and neither of us had time to adjust. I've been thinking the attempt through these past few minutes, and I believe I know what I did wrong. I'd like the chance to test my conclusion."

Roman grimaced, but the other clearly had a point—it was doubtful that even Tampy Handler trainees got it totally right the first time around. And if Demothi could claim to his sponsors that he hadn't had an adequate chance, Roman—or someone else—would just have to go through all this again. "All right," he said slowly. Gliding back to his seat, he strapped himself in again. "Wwis-khaa, give him the helmet. Mr. Demothi, you concentrate on setting up a stable contact before you try anything fancy like moving, understand?"

"Yes, sir."

Roman watched Demothi slide the bulky helmet over his head once more and unconsciously braced himself. The indicator lights blinked uncertainly, each flicking between red, amber, and green several times before finally settling down to green. The boat rocked gently once, but nothing worse happened, and as the lights continued their progression Roman had the eerie sense of watching history in the making. Demothi was going to make it . . . and then Roman dropped his eyes a fraction and focused on Demothi's face.

The man looked like he was going to explode.

"Sso-ngii!" Roman shouted . . . but he was too late. With another spine-wrenching tug the boat pulled sharply to the left. Sso-ngii was already reaching for the helmet, Roman noted as his eyes came back to focus. Another few

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seconds and Quentin would be under control again.

He wasn't prepared for the sudden lurch that hit the pit of his stomach an instant later . . . or for seeing the dim red star vanish from the side viewport.

Roman was unstrapped and halfway to the control area before Skald's uncharacteristic bellow cracked the sudden tension. "What the *hell?* It can't *do* that!"

Roman braked on the back of the pilot's headrest, eyes skimming the readouts. Fortunately, Quentin had quieted down as soon as it Jumped—whether from the exertion or Sso-ngii's influence, Roman didn't know. "Any idea where we are?"

Skald waved his hands in a gesture that looked as much angry as frustrated. "Computer's checking the brightest stars, but I *know* the nav program's not complete enough to have any real chance. If this were the *Amity* I could tell you in three minutes; as it is, all I can say is that we're in a system with an F8 star and probably still in the Milky Way."

Roman glanced at MacKaig. She was bearing up gamely, but the hands resting on her control board were rigid. "I don't think it's quite as bad as that," he said reassuringly. "Remember, Quentin's still a newborn. The number of places it can Jump to has got to be pretty limited."

"It's not supposed to be able to Jump at *all*," Skald muttered.

Roman glanced back. The two Tampies were sitting quietly, the helmet on Sso-ngii's head showing all green. Between them Demothi had the expression above his mask of a small child who has insisted on carrying the heirloom cyrstal and then dropped it. "Wwis-khaa, did you get any feel for Quentin's sensory abilities when you were in contact a few minutes ago? I'm particularly interested in its vision."

The Tampy's cocked head seemed to indicate surprise. "His ability to see was not yet strong. Only the brightest stars were clear to him. I understand what you think, Rro-maa. How long have you thought thus?"

"Only since Quentin Jumped." Roman turned back to Skald. "You get it now?"

The other nodded. "It's not that calves *can't* Jump at birth, it's just that they can't see anything clearly enough to get the necessary visual fix. And even after the stars start appearing, they won't ordinarily Jump until they can see enough of them to do whatever voodoo they do in place of navigation. Am I right?"

Roman's theory hadn't gotten to that latter point yet, but it seemed reasonable enough. "That's what I'm guessing—and if so, Lee's job will be pretty straightforward. The outriders saw us Jump, and he should be able to follow the same line of reasoning we just did. The *Amity* has complete data on the space horse visible spectrum, so he'll be able to figure out which stars look brightest to Quentin. All we have to do is flip on the emergency beacon and sit tight."

"Seems that way," Skald agreed, the cool control in his voice showing he was on balance again. "It would have saved everyone a lot of trouble, though, if we'd known about Quentin's Jumping ability sooner." He nodded minutely back toward the Tampies.

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Roman turned to face them. "True. How long *have* you known calves could Jump? And why haven't you mentioned it before?"

"Not long," Sso-ngii replied. "It was not thought important—"

"Not important!" MacKaig exploded. "Why do you think we're stuck way out here—wherever 'here' is?"

"It has long been known that humans have less interest in basic truth than in results," the Tampy said. "Whether the difficulty lies in the Jumping or in the seeing to Jump, the result is the same. If you had known would it have changed your actions?"

"Of course," MacKaig snorted. "We wouldn't have let Demothi use the helmet the second time."

"What's done is done," Roman put in brusquely, feeling a need to change the subject. "Let's cut out the recriminations and get something useful done. Skald, you can start by loading the survey program into the computer, see what this star has in the way of a planetary system. While he does that, MacKaig, you can unlimber the telescope in back and start running a spectrum reading. You know how to do that?"

"Yes, sir." MacKaig unstrapped and pulled herself through the air along the lifeboat's passenger seats, studiously ignoring the aliens and Demothi as she passed them.

Roman pursed his lips in mild frustration. He'd chosen MacKaig for this duty partly because she was one of the best small-craft pilots he had, but largely because her knowledge of Tampies so far was obtained almost entirely from the media and other third-hand sources. He'd hoped a short mission with the genuine article would help unravel some of her half-formed prejudices; now, though, he'd be lucky if she didn't emerge a confirmed Tamplistaphobe. *When,* he thought ruefully, *am I going to quit trying to change humanity single-handedly?*

"Rro-maa," Sso-ngii broke into his musings, "the horse has found a food supply and wishes to feed. May he?"

Roman slid into MacKaig's vacated seat and called up a scanner plot. "Where does it want to go?"

"Approximately fifty thousand kilometers in—" he paused, then raised a hand—"that direction."

"Skald?"

"Asteroid belt, Captain," the other answered promptly, indicating it on the screen. "Reflection data implies high metal content, as asteroids go."

Good feeding for a space horse, then. "What kind of density are we talking about?"

"Not dangerous, unless Quentin goes nuts again and tries to drag us through it retrograde," Skald said, running his finger down the numbers on one of the displays. "It's as good a place as any to wait for the *Amity*."

"Okay." Roman turned around and raised his voice. "MacKaig! Forget the telescope for now and come strap in." He shifted his attention to Demothi and managed to make his tone light. "It's time to feed the baby."

Demothi, his eyes focused somewhere between his knees and infinity, did not respond.

They had arrived nearly twenty degrees off the star system's ecliptic plane;

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but with a space horse as motive power such otherwise serious problems were reduced to mere annoyances. Under Sso-ngii's guidance Quentin pulled them toward the asteroid belt at a steady point five gee for just under an hour, turned around and decelerated for the same length of time, and finally accelerated again to match speeds with the drifting stream of rocks.

Floating once more behind Skald and MacKaig, Roman watched through the viewport as Quentin telekened a small boulder into one of the feeding orifices in the forward part of its cylindrical body. "What's the readout on those rocks?" Roman asked.

"Exceptionally rich," MacKaig told him. "We're picking up large amounts of iron, nickel, and silicon, and unusual concentrations of bismuth and tellurium, as well. Especially right here; even the stuff we passed while matching speeds wasn't as strong in the trace elements."

"A *yishyar*," Wwis-khaa murmured. His voice was dry and very alien, as if surprise had driven all attempts at human overtones from it.

"What?" Roman asked, frowning at the odd tone.

"This is a *yishyar*," the Tampy repeated. "A place for space horses to feed, sometimes together."

"A watering hole," Skald said suddenly. "Is that it?"

"I do not know this term; but there is surely no water here."

"Never mind. That's what it is, Captain—a place where they can get all the trace elements they need without having to eat a thousand tons of extra rock for them."

Roman nodded. Rumors of space horse watering holes were common, but the stories had seldom if ever been borne out by subsequent investigation. If they'd actually stumbled across a real one . . . "Skald, do we have a space horse locator program on board?"

"The kind that ties into the scanners and looks for shape and anomalous motions? I think so. Shall I cancel the planetary survey and get it running?"

"Yes. And tie in both recorder systems, too. If we run into a group of horses I want some good data out of it. Sso-ngii, I'd like you to get Quentin to pick up his speed a little. A few kilometers an hour won't affect his feeding any, and *it'll* let us survey more of the belt."

"Very well." The Tampy paused. "Rro-maa, the horse is not happy. I feel something is disturbing it."

Roman turned to face them. "Something from in here?" he asked cautiously. Heaven knew that between MacKaig, the Tampies, and Demothi there was tension to burn in the boat.

"No," Sso-ngii said. He handed the helmet past Demothi to Wwis-khaa, who put it on. "It is something outside, something that causes . . ." He trailed off.

"Uneasiness," Wwis-khaa supplied. "The horse is uneasy. Perhaps a bit fearful."

Something hard settled into the base of Roman's throat. Space horses were often skittish, could be spooked, and occasionally suffered trauma or stress . . . but this was the first time he'd ever heard of one being afraid. What the hell out there could scare even a baby space horse?

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He suddenly noticed the boat was very quiet. Everyone else, apparently, was wondering the same thing. "All right," he said, as calmly as possible. "Stay on that feeling, and let me know if it changes or gets any clearer. Skald, get that locator program going, but alternate it with the regular scan program. I don't want us to miss something important just because it's not shaped like a space horse."

They traveled for a time in silence, with questions and replies delivered in low tones. Outside the viewports several hundred asteroids could be seen at any given time, the nearest handful as irregular lumps, the rest as pinpoints of reflected light from the distant sun. Roman would never have believed it possible to feel claustrophobic in such a sparse collection of matter, but as the minutes dragged into hours the white dots on the radar monitor seemed to press closer in on the boat, and he found himself continually plotting updated escape routes through the moving boulders. He tried to tell himself it was just the effect of wearing a filter mask for so long, but he didn't really believe it.

Four hours after they began their search, the locator program finally pinged.

"It doesn't seem to be moving at all," Skald said, gazing closely at the readouts. "Just drifting with the asteroids."

"Something else funny, Captain," MacKaig added. "I can't seem to resolve part of its outline. It's like there's a chunk missing from one end."

Roman nodded grimly. "Sso-ngii, has Quentin detected the other horse yet?"

"Yes. His uneasiness is increasing."

Small wonder, if what Roman suspected was true. For a long moment he hesitated, tempted to wait until the *Amity* arrived and could send probes to check out the horse. But if the creature was merely injured, not dead, and if it Jumped before *Amity* showed up, the chance would be lost forever. "Let's get a little closer," he told the Tampy. "Let me know if Quentin shows any sign of spooking, though. If we Jump again we'll have no chance at all of being found."

"Movement!" Skald snapped suddenly. "Small objects—lots of them —moving away from that other horse."

"How small?" Roman asked, flicking his gaze across the readouts.

"Couple of meters across, maybe. Way too small to be space horses themselves." Skald paused. "They seem to be multiplying or growing somehow . . . no, they're collecting boulders —telekening them—as they go. Coming together again some thirty kilometers ahead of us."

"They're going to attack!" MacKaig gasped.

"Sso-ngii! Get Quentin ready to move—"

"Hold it, Captain," Skald cut in. "They're not attacking; or at least the edge I can see around Quentin isn't. They're holding position relative to us."

Roman hesitated, then looked back at the Tampies. "Any idea what those things are?"

"Tamplisstan records contain only unscientific reports," Wwis-khaa said. "It is reasonable, though, to assume that

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they are related in some way to the horses."

"And you'll notice they're staying well out of Quentin's range," Demothi spoke up.

Roman focused on him. "What do you mean?"

"Adult space horse telekene range is about twenty kilometers, occasionally extending to twenty-five. The creatures out there are making sure Quentin can't grab them."

Roman nodded, successfully hiding his surprise. Of course Demothi would have become a walking space horse data bank in the course of his preparations. "I see. Well, if Quentin can't telekene them, then they probably can't telekene him, either. Let's keep going and see what they do."

A thought occurred to him as the horse and boat again began to move: if the creatures up there couldn't recognize that Quentin was a calf, with only a fraction of the adult telekene range, they couldn't be very intelligent. It was something to keep in mind.

He had expected the creatures to hold their position and try to prevent Quentin's approach, and was thus surprised when Skald reported the group was maintaining both its cohesion and its distance. "Still directly in front of us?" he asked.

"Still in front of Quentin," Skald corrected. "I've been edging us out past Quentin to get a better view, and they don't seem to react at all to our movement."

A dark suspicion was beginning to form in Roman's mind. "MacKaig . . . run a check on the opacity of that cloud, using the space horse visible spectrum and acuity."

"You need not bother," Sso-ngii spoke up. "The horse cannot see through the cloud."

"*What?*"

It was the first time Roman had ever heard Demothi raise his voice, and he would have jumped if his feet had been firmly planted on the deck. "Why the hell didn't you tell us?" Demothi continued, his voice barely civil. "If Quentin can't see, then he can't Jump. That means we're trapped here!"

"But we must stay here in any case," Sso-ngii replied. "Do you not remember? We must wait here for the *Amity*."

"Besides, what could we have done if we'd known?" Skald put in. "Try to pick them off with our comm laser?"

"We could turn around and try to get away!"

"Get away to where? Besides, there doesn't seem to be anything imminently dangerous about them."

"I'm not so sure about that," MacKaig spoke up suddenly, her voice taut. "Captain, you'd better look at this."

In the past few minutes they had covered a fair amount of the distance to the quiescent space horse, enough that the scanners and computer enhancement program could now provide a reasonably sharp picture. Leaning over her shoulder, Roman studied the space horse centered in the main display.

Or, rather, the two-thirds of the horse that remained. Where the rest should have been was a ragged-edged hole.

Skald swore, gently, under his breath. "Captain, I think we'd better get the hell away from here."

"Agreed," Roman said through dry

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lips. "Sso-ngii, turn Quentin around and ease us away. Take it slow and gentle—we don't want to provoke those things with any sudden movements." Pushing off of Skald's seat, he settled into the first row of passenger seats and began to strap in, wishing the control area had an extra seat. There was no more frustrating and helpless feeling than to be stuck back away from the displays, but logic dictated that Skald and MacKaig be left at the controls, at least for now. "Wwis-khaa, you said you'd heard rumors about these things. Let's have it; everything you know."

"The reports are not necessarily reliable," the Tampy said hesitantly. "They are spoken of as . . . carrion-eaters, I believe the term is. Like Terran vultures, perhaps. They were first observed in the vicinity of a dead space horse in the asteroids of the Surthee-Lis system, but no recordings were made."

"Did these vultures make any move against the Tampy ship?" Roman asked.

"No. But the ship had a mechanical star drive and was not accompanied by a space horse."

"Did they see the horse die?" Skald asked.

"No, it was dead and being consumed when the ship arrived."

"Have there been other sightings?" Skald persisted. "Has *anyone* witnessed a horse dying before the vultures showed up?"

"There are no such reports," Sso-ngii put in. "Yet it is unlikely such small creatures could cause the horse's death, as you seem to be suggesting."

"It doesn't make sense any other way," Skald shook his head. "You've had some of your horses in captivity for seven hundred years now; no one even *knows* what their natural life span is. Are you going to try and tell me that the vultures just *happen* to show up at the exact place and time a horse dies?"

"This horse could have been dead hundreds of years before the vultures found it," Demothi pointed out. "Or perhaps they exist in huge numbers all over the galaxy, drifting in suspended animation like spores until a horse dies nearby. Or maybe a dying horse gives out a telekinetic or telepathic pulse that attracts them. We just don't know."

"You're talking like a Tampy thinks," Skald snorted. "Before you get all misty-eyed over the infinite variety of the universe and the need to refrain from preconceived ideas, let me point out that your allegedly passive carrion-eaters have made a distinctly active and rather hostile move toward *us*."

Roman glanced out the port beside him. The stars were stationary, implying Quentin had completed its turn and was pulling them away from the dead horse. "They're still with us?"

"Like they were welded there. Quentin is just too slow on turns to get ahead of them. And they brought that optical net of boulders with them, too."

An optical net. Strange terminology, Roman thought . . . and yet, that was exactly what it was. A semisolid disk that trapped them in the system as effectively as a corral ever held a Terran horse. Held . . . but why? "Skald," he said, interrupting Demothi's attempt to justify Tampy philosophy, "is that locator program still running?"

"Yes, sir."

"Can you modify it to skip the size

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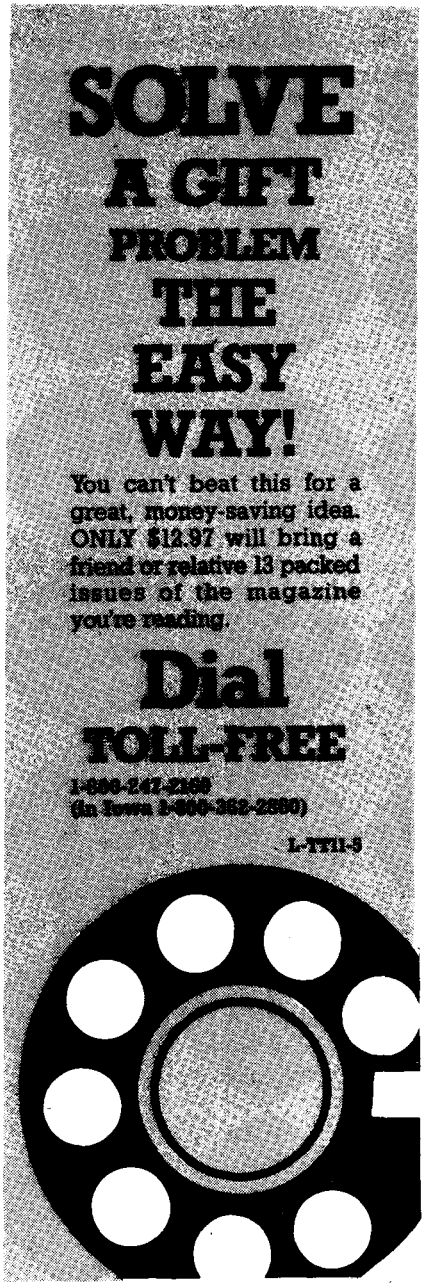

and shape parameters and concentrate instead on analyzing movement?"

Skald craned his neck to lock eyes with his commander. "You think the vultures are holding us here until something else arrives?"

"I can't see them breaking off a meal just for the fun of it," Roman told him, "and if they think they can starve Quentin to death in the middle of a watering hole they're dumber than they have any business being."

Skald nodded grimly and turned back to the computer console. Roman shifted his attention to the Tampies and Demothi. "Is Quentin picking up anything else in the system? Or acting more nervous than it was earlier?"

Sso-ngii didn't answer for a long second. "I do not know," he said at last. "I have never before felt such intensity in a horse before. I do not know how to interpret it."

"Well, what's it *like?*" Roman was fed up suddenly with Tampy reticence. "Does it seem closer to fear than to—"

"Movement!" Skald snapped suddenly. "One object, very large; bearing one hundred starboard, thirty nadir, range one-seventy kilometers. Closing!"

Roman resisted the instantaneous urge to hit his harness release and move forward for a look at the displays—and was immediately glad he'd done so. "Rromaa!" Sso-ngii called. "The horse is afraid—I cannot hold him—"

"Give him his head!" Roman barked. "Just don't let him Jump—"

The rest of his words were blown out with his wind as Quentin shot forward, ramming him two gees'-worth back into his seat. "Skald; report," he managed

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as his body struggled to adjust to weight again.

"No contest, sir—the thing's doing at least seven gees toward us."

"What about the vultures?"

"Still blocking us," MacKaig called out, her voice icily professional.

"How big is this thing, anyway?" Roman asked.

"Preliminary data says two kilometers long," Skald said. "I think we've got our horse-killer, sir. That thing's bearing down on us like a hungry shark."

"Set the comm laser to full intensity," Roman ordered, twisting his head to look out the port beside him. Would he be able to see the creature before it reached whatever its killing range was? "Get ready to fire."

"Captain, Quentin's running full away from the shark now," MacKaig reported. "That puts our stern directly toward it. Shall I set up a blast from the drive?"

"Good idea. Be sure to balance with the forward jets—we don't want to ram into Quentin."

"Laser's ready," Skald grunted. "Range forty-five kilometers—"

And without warning the weight was abruptly lifted from them. An instant later Roman was jammed painfully against his harness, the hiss of the forward jets in his ears. He caught just a glimpse of Quentin's dark bulk over Skald's shoulder as it rushed toward them—and with a grinding of metal the boat caromed off the space horse's side.

It took several seconds for Roman to shake off the stupor the rough ride left him in. "Skald!" he got out finally. "What happened?"

"Shark reached out and grabbed Quentin, I think," Skald said, his voice a bit slurred. "I couldn't stop us in time."

"We've got to kill it!" Demothi moaned from Roman's left. "It'll kill *us* if we don't."

Roman glanced back at the threesome. Demothi's eyes were screwed up tightly in fear or pain; the Tampies' expressions were, as always, unreadable, but both looked conscious and alert. "Sso-ngii, is Quentin hurt badly?"

"He is not yet injured." The words were barely understandable, as if the Tampy could spare only a tiny fraction of his mind for the task of speaking English. "He is being drawn toward the other . . . who will consume him."

Roman reached a quick decision. "MacKaig, give the shark a full-power spurt from the drive—we've got to distract it."

"But the distance—"

"Is too high," Roman cut her off. "But the shark's telekinesis undoubtedly gets stronger as we get closer. We've got to try it. Skald, ditto on the laser."

"Yes, sir."

Roman braced himself . . . and was squeezed into his seat for an instant as the roar of the main fusion drive filled the boat. The sound and acceleration cut off simultaneously. "Sso-ngii? Are we free?"

"The grip remains," the Tampy said, making an unfamiliar gesture.

"But we're not moving backwards any more," MacKaig said excitedly. "Maybe we've confused or startled it."

"Hit it again," Roman ordered her. "Skald, where the hell is that laser?"

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"Just a second, Captain." The drive kicked in and Skald raised his voice to a shout. "A feeding orifice is rotating into view—"

Even over the brief roar of the fusion tubes the *crack* of the comm laser's pulse-transmission capacitor was clearly audible. Roman tensed, wishing again he were up there with the displays. "Again!" he shouted. The capacitor cracked a second time—

And the lifeboat leaped forward, swaying wildly back and forth like a pendulum. "Sso-ngii!" Roman snapped, fighting the slight nausea that the sideways motion induced.

"He is free," Sso-ngii said. "He is running toward an asteroid where he hopes to hide."

"Skald; give me range numbers."

"The shark's falling back—doesn't seem to be pursuing. Range, fifty kilometers. I think we're out of its telekene range, Captain. The vultures—" He paused. "The damn vultures are still with us."

Roman nodded minutely against the acceleration. "Half a victory's better than none, I suppose." He hesitated; the question he was about to ask would most likely be so much wasted breath. "Wwiskhaa, is it likely we've discouraged the shark permanently? Quentin is a pretty small mouthful for a predator that size, after all."

"I do not know," came the predictable reply. "But you humans are a species of predators yourself, are you not? You can undoubtedly form a more accurate thought than could I."

Roman grimaced. "I'm afraid I probably can."

And the thought wasn't an encouraging one.

They fled at a full two gees' acceleration for nearly ten minutes before Quentin could be persuaded to ease up. Under Sso-ngii's guidance the horse modified its speed and heading until it was paralleling a particularly dense section of the asteroid belt. "Maybe we should try weaving in and out, see if we can throw the vultures," MacKaig suggested.

"Probably a waste of time," Skald shook his head. "However they hold station in front of Quentin, they're not doing it strictly by visual means."

"What makes you think that?" Roman asked.

"When they first moved on us they were nearly a hundred kilometers away," the other explained. "Quentin's only about a hundred meters long, with a maximum width maybe twenty-five. The difference between head-on view and complete broadside would have been only sixteen minutes of an arc. That's your thumbnail at seventeen and a third meters; yet they *immediately* settled in directly in front of Quentin. I don't believe their eyesight can be that good."

"I don't see what difference it makes *how* they do it," Demothi spoke up impatiently.

"How it matters," Roman told him, "is that whatever they're locking onto is very likely the same thing the shark's going to use to track us if and when it decides on a rematch. Sso-ngii, Wwiskhaa—do you know of any long-range senses space horses have that the shark and vultures may be duplicating?"

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"There is evidence that the internal source of telekinetic power is detectable," Wwis-khaa said. "In addition, much of a horse's energy is produced by micro-fusion and -fission reactions within his body. The neutrinos from these reactions may be detectable, as well."

"I'd go with the telekene-detector, myself," Skald said. "The direction or distribution of the ability is clearly asymmetric—otherwise horses could back up—and that'll clearly define front and rear for the vultures in a way neutrino emission probably can't."

"Well, good," Demothi growled. "Now let's hear how that's going to help us fight back—or do you know a way to block telekene emissions?"

"No, but if that's what's attracting the shark the solution's obvious," Skald returned calmly. "We cut Quentin loose and let it run. It either gets away from the shark or gets eaten; either way, we can most likely wait here undisturbed until the *Amity* arrives."

Roman had long since become used to Skald's coldly practical view of the universe. Demothi had not, and he actually sputtered before he could get a response out. "That's the most *despicable* idea I've ever heard in my life," he snarled at last. "Quentin wouldn't have a chance, and you know it."

Skald regarded him coolly. "So? It appears that the natural order of things out here is for sharks and vultures to eat horses. I'm sure your Tampy friends there would tell you that ecological systems are to be respected."

"You're talking about a space horse *calf*, blast you—a calf who wouldn't even *be* here if it weren't for us."

"It's survival of the fittest," Skald countered, graciously passing up the obvious comeback to Demothi's last comment. "Sso-ngii, isn't this the heart of the Tampy philosophy?"

"We respect all living things and the systems in which they live," the alien replied. "Yet, in accepting the horse's service, we have in return tacitly offered it our protection. We cannot turn it free under such dangerous conditions."

"Besides which, it would only postpone the problem," Roman put in, glad he'd let the Tampy speak first. He hadn't really wanted to abandon Quentin, but hadn't known how to counter the logic in Skald's suggestion. "The minute *Amity* gets here they're going to be in the same fix we're in now. What we have to do is try to find some weakness in the shark that we can exploit. Skald, where exactly were you hitting with the comm laser? A sensory cluster?"

"I think so, sir. There was an area around the orifice I saw that looked like a space horse-type sensory ring. I don't suppose I did any permanent damage, though."

"Unlikely." Space horses could go perilously close to even the hottest stars, absorbing both electromagnetic and particle radiation over a wide spectrum range without any trouble. Neither laser fire nor fusion exhaust in the intensities the lifeboat could generate were likely to seriously bother a space-going cousin the size of the shark. "What we need is a way to concentrate a great deal of energy into either a small area or a short period of time if we're going to overload its absorption ability."

Wwis-khaa seemed to shift in his

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seat. "You speak of attacking the shark, perhaps injuring or even killing it. It would be preferable if another way could be found."

Beside him, Demothi snorted impatiently. "You'd better decide just who it is you're trying to protect—Quentin or the shark."

"Why may we not protect both?" the Tampy asked. "If we can simply evade the shark until the *Amity* arrives and then disrupt the optical net which prevents our escape—"

"And how do you expect us to do anything to the vultures when they stay on Quentin's far side and thirty kilometers away?" Demothi snapped.

"As a matter of fact, Wwis-khaa's right," Skald said. "We can't hope to kill the shark—neither we nor the *Amity* is equipped with fusion bombs or military lasers. All we can hope to do is find a way out of here with our skins intact, and the optical net is the best point to hit."

Demothi's eyes were incredulous over his filter mask, but Roman nodded his agreement. "I think he's right. MacKaig, what's the latest on the shark?"

"It's moving again, sir," she reported. "Heading at about one point four gee on a course which I believe will take it back to the dead space horse."

"Vultures still with us?"

"Yes, sir. But the shark may not have any way to call them back."

"I doubt that the shark's really lost interest," Roman said grimly. "The advantages of eating a space horse are the same as feeding at a watering hole, only more so: all the trace and rare elements it needs, all in the right proportions and concentrated in a single package. No, it'll be back, and we have to come up with something before that happens."

"From your tone, Captain, I'd guess you already have something in mind," Skald suggested.

"Possibly," Roman acknowledged. "It depends on how much spare space horse webbing we're carrying and on what sort of miracles you and MacKaig can do with lifeboat engines. Here's what I've got in mind. . . ."

It turned out not to require any miracles after all; Roman hadn't realized just how readily lifeboat equipment could be disassembled and recombined, though in retrospect such a design seemed obvious for an emergency survival craft. MacKaig had the necessary knowledge, but even with help from the others the job took nearly two hours to complete. It was a good thing, Roman thought, that the shark wasn't in any hurry.

"Now what?" Demothi asked when the oddly shaped missile was finally mounted on the outer hull and MacKaig was back inside.

"We wait," Roman told him. "If this works we'll have a clear Jump window for only a few seconds. We need to make sure we Jump back to civilization and for that we still need the *Amity*."

"And if the shark attacks before then?"

Roman was spared the need to come up with an answer. "Captain, I've got them!" Skald called from the command area. "The *Amity*'s here!"

MacKaig was still in the rear of the boat, stowing her EVA pack. Roman

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pushed off his seat and guided himself into her vacant control area station. "Is the laser tracking them yet?" he asked Skald as he plugged his jack into the long-range communicator.

"Yes, sir, and I've sent an acknowledgment. Clocking a time lag of four seconds . . . five . . . six . . ."

"Ahoy, lifeboat!" Even the crackle of charged-particle static behind it couldn't hide the relief in Chen's voice. "Don't you know it's impolite to leave a party when the host is out of the room?"

"Never mind that," Roman said. "Can you tell us where we are and how to get back?"

Chen's voice continued cheerfully on as Roman's words crossed the gap. About three light-seconds away . . . nine hundred thousand kilometers . . . almost four hours at a two-gee acc/dec course. "'Course we can, skipper. Here comes a complete nav dump." A light on the console flicked on, indicating incoming data. "As to exactly *where* we are, Quentin made one heck of a Jump for such a little squirt—to NAL 1620, also known as Gamma Cygni. About four hundred seventy light-years from Earth—"

"Listen," Roman called over the other's chatter, "we've both got to get out of here right away. Do you have a clear Jump window?"

"—says this is a *yishyar* where space horses meet . . . No, as a matter of fact we've picked up a following of some sort—little things that insist on sitting directly in front of Man o' War. Annoying, but so far not dangerous. No one's figured out yet how to get rid of them."

"You'd better find a way, and fast. I take it you haven't seen the dead horse yet? Or the creature that killed it?"

The pause this time was longer than usual, and when Chen's voice came back it had the unmistakable strains of high-gee acceleration. "No, we haven't. You'd better fill us in."

Roman did so. When he finished Chen was silent for a long moment. "All right," he said at last. "We're running toward you at four gees—ETA about two and a half hours. Can you think of any reason to hold off trying your netting trick?"

"Not really. Now that we know where we're going, the sooner we get out of here the better. If we get cut off we made it, and we'll wait for you at—" he checked the nav display, found the brightest star— "at Deneb."

"Deneb, right. Good luck, skipper."

Skald already had the programming set up. "Move us out," he ordered Wwis-khaa, who had taken Sso-ngii's place under the helmet. "Turn Quentin about thirty degrees port, seventeen nadir—big bluish star standing all alone."

A minute later Quentin was in position, at least as well as Wwis-khaa could tell with the vultures' interference. "Missile ready: *fire!*" Skald said.

With a flash of low-power fusion thrust their creation leapt away from the hull. It streaked past Quentin as Wwis-khaa twitched the horse aside; and with the delicacy of a surgeon the Tampy turned Quentin back again until the optical net was directly in line with the oncoming missile. Roman held his breath . . . and a second before impact the miniature star suddenly blossomed into a filigree of space horse webbing.

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At five hundred meters a second the two nets collided—

"Wwis-khaa!" Roman snapped, his eyes on the displays.

"The horse cannot yet see the star," the Tampy said.

Roman's hands formed themselves into fists as the webbing swept through the mass of vultures without obvious effect. "Skald, what's happening?"

The other was frowning at the more sensitive scanner readouts. "Near as I can figure, sir, the webbing caught a bunch of the vultures and dragged them out of the way, but before it could move itself clear the rest filled in the hole." He scowled. "Damn. They're wriggling out the open end and going back to the main swarm now. Three or four missiles, and a mechanism to seal the webbing, and we might have a chance."

Roman nodded, a sour taste in his mouth. "You copy that, Lee?"

"Loud and clear," Chen's voice came after the usual delay. "Alternatively, we might be able to send one of our web boats out to collect the whole bunch. When we get to you—" He broke off abruptly, and Roman could hear the faint sound of background conversation. Excited-sounding conversation; and when Chen's voice returned it was taut. "Your shark's on the move, skipper. We've picked it up on what appears to be an intercept course. Pulling five gees . . . ETA less than two hours. Good *Lord*, that thing's big."

"Tell me about it. All right, I doubt that there's any point in skulking around any more. Give us a course and we'll meet you halfway."

"If you think it's safe enough —Quentin isn't exactly a heavyweight fighter, after all. Okay, Kennedy's sending your specs now. Looks like a rendezvous of an hour fifty minutes. A bit tight."

"Especially since the shark can hit seven gees or more," Roman agreed grimly.

"Yeah. Well, Man o' War can go up to six if necessary. We'll keep an eye on the shark, and if it speeds up we'll try and compensate."

"I guess that's all we can do for now. Let's pool our brains and see if we can come up with something better."

The trip was uneventful but illuminating. Even handicapped by four times normal weight the *Amity*'s scientific specialists managed to collect a fair amount of data on their pursuer.

"The damn thing seems to be practically covered with vultures," Chen reported. "Sort of like remoras hitching a ride with an Earth-type shark."

"All set to join in and help eat whatever the shark kills," Roman grunted. "But in this case the vultures play an active part in the hunt."

"Yeah—and that may give us some trouble. It looks like the shark's carrying about four times as many vultures as we've got with us right now. That's a lot more than we're likely to be able to web up, especially if they come in in shifts."

"Especially with a shark breathing down our collective neck at the time," Roman added. He thought of how the giant predator had retreated to the dead space horse after their first encounter. Had it gone there to collect the rest of the vultures, to have its full attack force ready for the unknown thing that had fought back so strangely? He hoped not.

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Outmaneuvering an instinct-controlled monster like that would be hard enough. If it possessed high intelligence as well . . . "You have any more good news?" he asked.

"As a matter of fact, I might. Kennedy came up with a screwy but intriguing idea a few minutes ago. Our respective optical nets are maintaining a thirty-kilometer distance which, we agree, keeps the vultures out of telekene range. What happens if we run Man o' War and Quentin nose to nose?"

Roman opened his mouth, closed it again. "That *is* an intriguing question. I think it's worth trying."

"Me, too. Well, in an hour seventeen minutes we'll get our chance. By the way, we've done an analysis of your recorder data, too, and indications are that the shark is better at sprints than long-distance runs. It waited until you'd reached the closest approach to its position before attacking, and its acceleration started dropping a minute or so before it grabbed you. Even now it seems to be pacing itself, accelerating just enough faster than Man o' War to gain. Be interesting to see what happens when we reach turnover and start decelerating."

"Well, it presumably can't do much feeding if it shoots past Man o' War at high relative-vee. What you're saying, though, is that there's a chance of outrunning the shark—and if we can, then we may have the time we'll need to clear away the vultures."

"Right. Maybe you should turn around, in that case, so that we're both running away from the shark."

Roman pursed his lips. "No," he said slowly. "I can't see any way Quentin could outrun it—its maximum acceleration's still too low. I'm afraid Kennedy's nose-bumping scheme still sounds like our best bet."

"We could connect a rein line to you and let Man o' War do all the towing," Chen suggested.

"Be too hard to match velocities at this stage," Roman decided regretfully. "Any progress on a way to—" he hesitated; the Tampies would be listening—"to neutralize the shark?"

"Not really. Scaling up from known space horse parameters gives us the power density we have to shoot for, but so far no one's come up with any way to generate it."

"Keep working on it. If the nose-to-nose doesn't work on the first pass we'll have no choice but fight the shark."

As Roman had half expected, the shark reacted to their turnover maneuver by beginning a deceleration of its own, a deceleration which *Amity*'s computers indicated would bring it to zero-vee relative at approximately the same time and place as Man o' War and Quentin. "In other words, it recognized it would overshoot us if it continued its original acceleration, calculated the proper deceleration and course changes it would need—and all in under half a minute," Roman commented to Skald.

The other nodded. "Whatever space horses use for brains, they'll be scaled up two and a half times in the shark," he pointed out. "And predators are generally more intelligent than their prey, anyway. I hope to hell this trick works."

"Likewise." Roman craned his neck. "Wwis-khaa, you know exactly what to do?"

"I am prepared," the Tampy said,

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without elaboration. Roman nodded and returned his attention to the displays. From all indications, the race was going to be very close.

It was.

"Got you on visual," Chen reported. "Range about sixty-one kilometers. Our respective optical nets should pass each other any time now."

As yet, the mass of vultures on the lifeboat display showed no change. "What's your reading on the shark?" Roman asked.

"Coming in fast." The other's voice was tense. "It's about two thousand kilometers out, decelerating at five gees. We've got under five minutes if it holds that."

"Right; here goes. *Now*, Wwis-khaa."

Almost immediately there was a pull to the side as Quentin began a gentle starboard turn. A minute later, at Skald's order, they straightened out again and continued on toward Man o' War, who had performed a similar circling maneuver. "Dead on, sir," Skald announced, his gaze on the inertial guidance system display. "Deneb should be directly ahead."

Roman nodded, not taking his own eyes off the radar. "Optical nets intersecting . . . no . . . no, damn it, they're not. They're pulling in closer to us; range twenty-five kilometers."

"Shouldn't really matter, as long as both sets are forced into telekene range," Chen grunted. "Hhom-jee says a little closer and Man o' War can start in on them."

"Wwis-khaa? How about Quentin?"

"There is no chance yet," the Tampy said. "His reach is less than four kilometers; we must wait until they come within that distance."

"You won't have the chance," Chen said grimly. "The shark's launching more vultures—ETA about a minute. I think it's caught onto what we're trying."

Roman's breath jammed in his throat. "That tears things. All right. The second Man o' War clears a path, you get the hell out of here. Go for help—one of the warships patrolling the border or something."

"We can't leave you here alone!"

"Sure you can. If worse comes to worse we can let the shark have Quentin—" *whether the Tampies object or not*, he added to himself. "It's certainly not interested in *us*."

"You don't know that," the other shot back. "Every element a space horse needs is present in that boat's structure or equipment. They're in different compounds and alloys, sure, but who knows whether the shark will care?"

"Lee, if you stick around you're risking the life of everyone aboard the *Amity*. Now get *out* of here."

"Sorry, Captain," Chen said, his voice tightly formal. "You left me in command, and I'm exercising that authority. Now, I want *you* to turn tail and start hauling gees while we see if we can slow down the shark a bit."

Roman's jaw was clenched tightly enough to hurt, but there was no way he could argue with any of Chen's logic. "All right. But hit it hard and run, understand? Wwis-khaa, bring us about and go."

The battle—at least from the lifeboat's point of view—was short, fierce, and completely unspectacular. The ren-

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dezvous run had ended far off the ecliptic plane, and in the absence of reflecting dust *Amity*'s laser beams left no trace of their passage. The fusion drive exhaust, glowing with its own light, was at least visible; but from all the effect it had as it swept the shark's black hide Chen might have been using flashlights. The shark, too, seemed to have learned something from its earlier taste of such weaponry, staying farther back and using some of its vultures to shield its sensory clusters. For a long minute Roman wondered if perhaps it had learned too much . . . and suddenly Man o' War was moving, pulling *Amity* away at high speed. "Lee!" he barked, eyes on the unmoving shark. "What happened?"

"We outsmarted it." Chen's voice again showed high-gee strain, but there was no mistaking the satisfaction in it. "We suckered it into moving a few meters too close, and Man o' War was able to telekene enough of that vulture screen away for us to get a clear shot at one of the sensory clusters."

"Captain, the shark's moving again," Skald reported.

"Yes, but not very fast," Chen said. "We'll both get a good head start."

"We're talking temporary victory, though," Roman shook his head. "I doubt that that same trick will work on the shark again, and it can still catch us anywhere we try to go."

"Surely the vultures can't keep this up forever," MacKaig argued from behind Roman. "They're doing a lot of work, and they can't have as much of an energy reserve as the horses. We should be able to eventually run them into the ground."

"Unfortunately, the shark's reactions so far suggest it would move pretty quickly to counter that kind of gambit," Skald told her. "There are enough vultures to cover us in shifts, if it comes to that. No, whatever we do has to be something the shark won't see as a threat either to itself or its outriders."

"Something basically unnatural, in other words," Roman said. "Something outside its experience." An idea was beginning to form in the back of his mind. Tricky, potentially disastrous . . . but it might just work. "Lee," he said slowly, "I want you to plot an intercept course back to us—approach as parallel as possible so the shark won't think we're trying another nose-to-nose trick. You still have some spare webbing, don't you?"

"Lots of it. Why?—you're not thinking of trying to net the shark, are you?"

"I'm not *that* desperate." Roman took a deep breath. "But I'm close. Connect me with the Tampy section, please; it's going to be up to them to decide whether what I've got in mind is even possible."

And for once in their lives, he pleaded silently, *let them be willing to speculate.*

The rein lines were softly glowing strands brushing across the lifeboat's ports, impossible to focus on even at such close range. Roman's eyes stubbornly tried to do so anyway as the rest of his body braced for the wild ride that would mean Quentin had lost control and panicked. But the half-expected surge of acceleration didn't come . . . and eventually Chen's confirmation did. "All set, skipper," he said. "Web boat's coming back in now."

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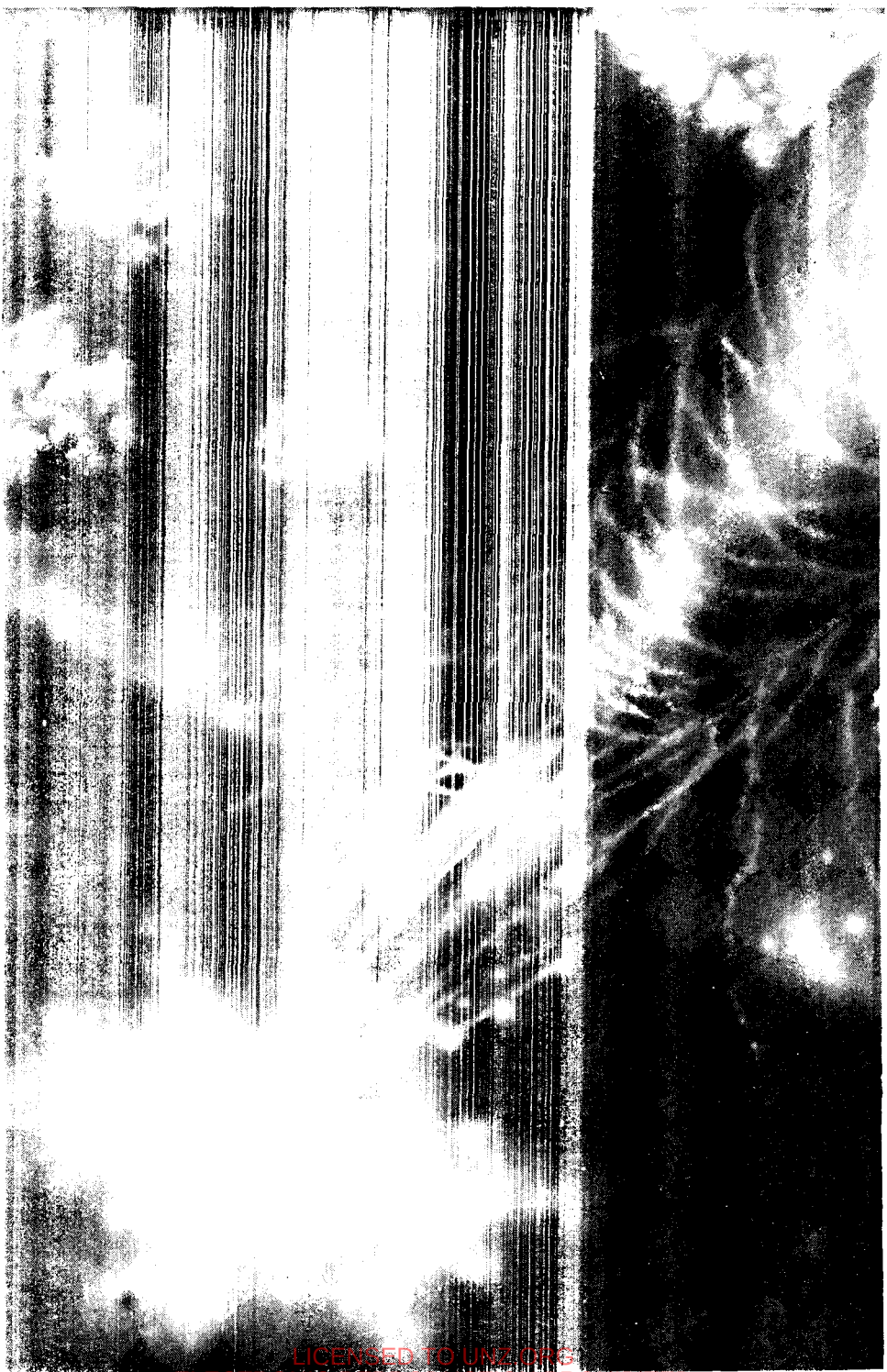

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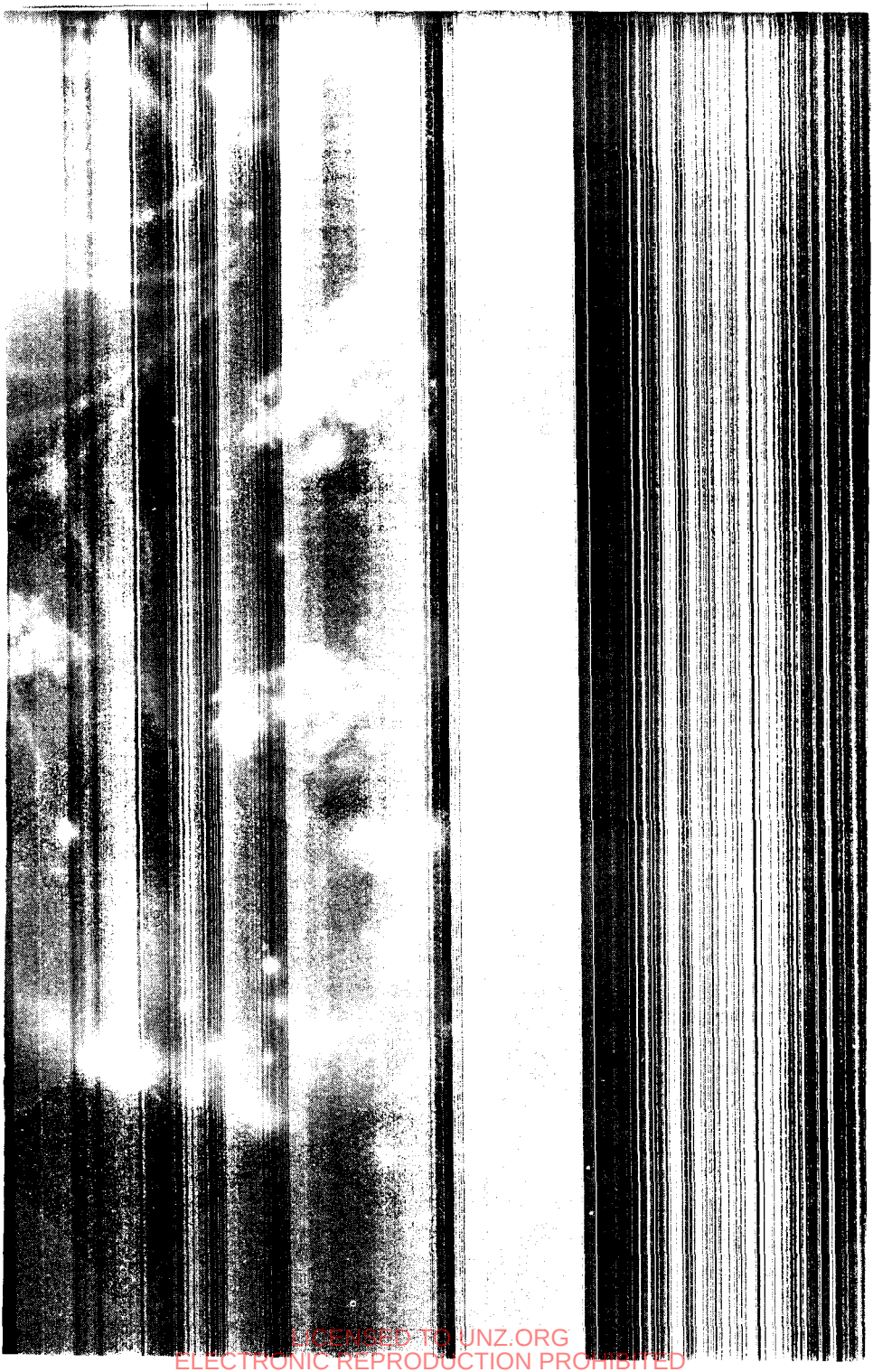
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It was Roman's signal to start breathing again. "Great. Keep firing the lasers until he's back in the hangar—the longer we keep the vultures confused the better chance we've got. Wwis-khaa . . . how is Quentin taking this?"

There was a long pause, and Roman stole a glance backwards. He immediately wished he hadn't; the Tampy's face was twisted into an expression Roman wouldn't have thought even such alien features capable of. But the helmet's lights were solidly green.

"He is . . . enduring," Wwis-khaa said thickly. "He recognizes the . . . need . . . though he is . . . not comfortable."

"Yeah." Or in other words, the old half-joke about the claustrophobe in the escape pod had come to life. Quentin understood intellectually—or however a space horse understood things—what was being done to it and why, but the knowledge was of little comfort to its deeper instincts. Roman wondered uncomfortably whether it would be able to hold on . . . whether the intimate contact with Wwis-khaa would drive the Tampy insane too if the young horse broke . . . and how Man o' War was handling its own share of the trauma.

"Web boat's secured." Chen's voice, cutting into his thoughts, made him start. "Ready to go."

Roman turned his attention to the displays. It was a little hard to tell . . . but it looked like the optical net in front of Quentin was slowly breaking up. "Skald, I think they're leaving."

"But pretty slowly," the other said. "Confused, I'd guess, but not really sure."

"Yeah. Lee—see if you can get Man o' War to start accelerating again."

"I'll try, but I don't know if we can. Hhom-jee's got his hands full just keeping the horse calm."

"We've got to risk it. The shark's not all that far behind us, and it might figure out what we're doing any minute now. We've got to give the vultures something else to key onto."

"Never mind," Skald snapped. "They're moving off—we've got clear space!"

"Wwis-khaa?"

"The horse . . . can see . . . the star," the Tampy gasped.

"Then *Jump*, damnit!"

"I am . . . trying. He does not . . . respond."

Roman took a deep breath. "Demothi, take the helmet," he ordered. "If we can't persuade Quentin we'll spook it."

"No!" Wwis-khaa snapped, the word bursting out like an explosive decompression. His eyes squeezed shut—

And Quentin, webbed to Man o' War's rear flank like an unwilling papoose, finally got the message.

An instant later the blue-white giant that was Deneb exploded into view ahead of them.

"Lee? You still with us?" Roman called. He needn't have bothered; Chen's triumphant war whoop was all the answer he needed.

They'd made it.

"Well, if nothing else, we conclusively proved space horses never have sex," Chen commented as *Amity* prepared for its final Jump to Solomon system and home.

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"Just because Man o' War and Quentin could barely stand to be in such close contact for a few minutes?" Roman asked, forming his words carefully. Sixteen hours with a filter mask on had left a surprisingly painful welt across his cheeks and jaw. "Not really. They may have a different way of exchanging genetic material when they get the chance. For all we know some second cousin of the vulture might ferry it back and forth between them."

"Yeah." Chen threw him a sideways glance. "You realize, of course, that that trick shouldn't have worked. Even with Man o' War's telekene emissions or whatever masking Quentin's, the vultures should have been able to stay more or less in the right position to block the Jump. Unless you're going to suggest they forgot how many horses they were guarding."

Roman shrugged. "That's not all *that* improbable, actually. We have no idea of their intelligence or lack of same. But I suspect we just hit them with something they'd never seen before and didn't know how to handle."

"Two space horses practically sitting on each other?"

"*And* linked by a web that enabled one of them to Jump for both," Roman amended. "Remember that, by all rights, that maneuver should have ended with Quentin gone but Man o' War still trapped. From their point of view the vultures were playing reasonable percentages." He looked out the bridge's side port, to where Quentin was paralleling the *Amity*'s course with a lifeboat full of Tampies in tow. It would make only a brief stop at Solomon, and then be routed to a Tampy system where what Sso-ngii described as a trauma center had been set up. Roman winced in sympathy, and for the first time understood a little of how the Tampies themselves must feel when watching some environmental stupidity being perpetrated by humans. None of the shocks Quentin had gone through were really Roman's fault, but he couldn't help feeling the weight of responsibility for what had happened. "Oh, well," he sighed. "At least this gives humans and Tampies something new to join forces on. We're going to need to find out if that shark is the first of a migration towards our shipping areas, and if so it'll have to be neutralized."

"By human warships drawn by Tampy-Handled horses, I presume?" Chen suggested doubtfully. "Fine—but only as long as Demothi or someone like him doesn't finally figure out how to make contact. I hate to think what horse-drawn warships controlled exclusively by either side would do to the tension at the border."

Roman shook his head. "No chance. Tampies don't build warships, and no human will ever be able to Handle a horse."

Chen blinked. "Why not?"

"Because sharks exist. Because there are predators in this space-going ecology," he amplified as Chen continued to look mystified. "Don't you see? We never knew before that there was anything out there a space horse had to be afraid of. Now we do, and all the human failures to establish any kind of rapport with the horses suddenly make sense."

"But why—?" Chen broke off, his mouth twisted. "Because we humans are predators ourselves?"

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"I think so," Roman nodded. "Maybe they can sense the difference between us and something like the shark at long range; otherwise we'd never be able to ride with them. But with a contact helmet—well, I know how *I'd* feel if a tiger was trying to climb into *my* brain."

"Makes sense." Chen tapped his fingers against Roman's armrest. "A shame we couldn't somehow have captured one of those vultures before we Jumped. There's a lot we don't yet know about them and the shark—things we're going to have to know."

"Yeah. But we'll figure it all out in time, Lee—mankind's always been lucky that way."

"Maybe. I guess we'll find out."

Gazing out at Quentin again, Roman suppressed a shiver. A hundred meters long; two hundred fifty thousand tons of living matter . . . and utterly dwarfed by the shark. *Yea, though I walk through the valley of the shadow of death*, the insolent parody ran through his mind, *I will fear no evil—for I am the meanest S.O.B. in the valley.*

Perhaps that slogan was about to be proved false. ■

ON GAMING

(continued from page 103)

shields, and use other instruments and equipment.

After determining power allocation, you move the star ships using a proportional-movement system to reflect relative speed. If the enemy comes within optimum range during movement, you may fire weapons.

Play continues until one player's ship has taken so much damage it no longer has a chance of winning, and attempts to escape at high trans-light speed. If you manage to keep your ship relatively undamaged while inflicting maximum damage on your opponent(s), you'll win the scenario and be one step closer to making Admiral.

Star Fleet Battles has three basic design concepts: energy allocation, ship's systems display, and proportional movement.

In essence, energy allocation is a management tool to draw power from the warp (anti-matter) engines, the auxiliary (nuclear) reactors, and, for short periods, from batteries. You keep track of this on the form provided. There's usually enough energy to move full speed, fire all weapons, raise all shields, and operate all other equipment at the same time.

If you'd like to try *Star Fleet Battles,* and would like some guidance getting into the game, there's a contact service of experienced players who can help you. To find players in your area, wrte: Amarillo Design Bureau c/o Task Force Games, 1110 North Fillmore Amarillo, TX 79107. ■

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The Alternate View

MEMORY AND PERSPECTIVE

G. Harry Stine

Each of us suffers from the same secret delusion:

We believe deep down inside ourselves that the universe really didn't exist before we were born.

This leads to nostalgia for the "good old days." It's easier to look back with distorted memories than to face the future with all its unknowns.

As a species, we not only have short memories and tend to forget the bad memories; we also seem to exhibit a general lack of perspective. We don't realize how far we've come in the past century. This isn't a new phenomenon. In the 19th century there was a Romantic Period of "back to the simple life" of shepherds. We've just come through a decade of what will probably be looked upon as the Romantic Period of the 20th century, when some people went "back to the simple life" of no-tech . . . until they discovered what going back really meant.

We're reminded of the ways things actually were on occasion; and a friend of mine, Dr. Otto L. Bettman, has written a neat little illustrated book, *The Good Old Days—They Were Terrible!* (Random House, ISBN 0–394–70941–1, $4.95). I recommend it highly to you—if you've got a strong stomach—because it paints a picture of things as they actually were in America a hundred years ago.

You may recognize the author as the founder and head of the Bettmann Archive in New York. As a 1935 immigrant from Nazi Germany where he was curator of rare books at Berlin's State Art Library, Dr. Bettmann began collecting old-time prints and photographs, keeping his collection at first in a few cigar boxes. The Bettmann Archive now contains more than three million prints and photographs and is widely used by publishers, educators, advertising people, graphic artists, and the audio-visual media.

The book is a collection of these prints and photos from the period 1860-1900. This is America as it was actually seen by illustrators and photographers.

If you think we've got things bad now, you need to read this book!

The good old days were the good old days for only a privileged few. For the average person—the farmer, the industrial worker, the housewife—life was a short, brutal period of unremitting hardship because of air pollution, lack of sanitation, poor food, poisoned drink, drugs, long hours of work at low pay, little or no education, rampant crime, hazardous travel, brutal quackery posing as medicine, and violent and senseless forms of leisure if you had some spare time.

Living in the cities was pure hell. It was considered a sign of feminine delicacy to complain about bad air. "We

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should be grateful for God's goodness in making work which made smoke which made prosperity." Some "experts" even believed that smoke loaded with carbon, sulfur, and iodine acted as a curative for lung and skin diseases and that smoke prevented malaria.

"Smog" was a term coined in 1905 by a Glasgow sanitary engineer, not a Los Angeles environmentalist. In 1880 New York City contained 287 foundries and machine shops, a printing industry powered by 125 steam engines, plus numerous bone mills, refineries, and tanneries. Have you ever smelled a tannery? Most people today haven't.

It was the Golden Age of Rubbish. There was no regular garbage pickup, and landfills didn't exist. The wastes of daily life—kitchen slops, cinders, coal dust, horse manure, and spoiled merchandise of all sorts—were simply piled up on the sidewalks, forcing pedestrians to clamber over heaps of trash or, when it rained, through a bed of slime.

But the worst city polluters were the four-legged kind. In the 1860s 450,000 pigs were herded through the streets of Cincinnati every year to be slaughtered; Urbana, Illinois, boasted more pigs than people. Can you imagine what a mess and what a public health problem these pigs created? How about horses, the major source of motive power before the now-reviled internal combustion engine came on the scene? New York City alone had more than 150,000 horses, each one producing about 25 pounds of manure per day, a pile of road apples amounting to 2,000 *tons* that was deposited on the streets daily, attracting swarms of flies and radiating a powerful stench further exacerbated by block after block of livery stables filled with urine-saturated hay. During dry spells, traffic pounded this stuff to dust which blew "from the pavement as a sharp, piercing powder to cover our clothes, ruin our furniture, and blow up into our nostrils." The "U-Needa Biscuit in its air-tight sanitary wrapper" was still in the future; therefore this potent powder also coated the meat, produce, and other groceries that were exposed to the open air in both stores and homes. Pessimists feared that American cities would disappear like Pompeii—but not under ashes. No wonder people hailed the coming of the clean, internal combustion engine!

How would you like to live with all of this in the stifling humid heat of summertime?

Housing? The worst slums of today are only a small part of our cities, but they comprised the majority of the urban living facilities in the last century. Between 1868 and 1875 in New York City an estimated 500,000 people—about 50% of the population—lived in slum conditions. As many as eight persons shared a room six by eight feet in size. The rent per square foot for these slums was 25 to 35 percent higher than that of fashionable uptown apartments. Today's filthiest slums are probably cleaner and more sanitary than the tenements of the 1890s because current slums have running water and inside plumbing. Think of what it would be like to live with a few outdoor privies serving a whole building and water of doubtful cleanliness available only from a spigot or well outside the building.

There were no fire escapes to lie on in the summer heat. In fact, if a fire

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started—which it often did in those flimsy structures—most people didn't have time to get out before the whole building was engulfed in flames. Between 1870 and 1906 four American cities—Chicago, Boston, Baltimore, and San Francisco—burned to the ground, a record unmatched anywhere in the world.

Rural life was no better. While cities such as New York were working to construct reliable, hygienically controlled water supplies, country folk had to depend upon the stone well and the old oaken bucket, nostalgia items that even then evoked pipe dreams of pure spring water. A modern environmentalist complaining about the chemical manipulation of urban tap water has an unwarranted confidence in nature's ability to purify in contrast to mankind's tendency to pollute. For practical purposes, the well was usually close to the farmhouse because water had to be carried in for domestic use. And the farmhouse itself was built close to the barnyard, stable, pigsty, chicken coop, and cesspool. There's a report of one country doctor (who might be expected to know better today) who had a cow barn, a privy, and a well all within a hundred feet of his kitchen.

If you became ill in either the city or the country, you were in trouble. An epidemic of yellow fever raged through Memphis in 1878, killing 5,170 people; out of a population of 38,500, 20,000 people deserted the city in an effort to escape the disease. It would be unthinkable today to lose more than 13 percent of a city's population to a single disease epidemic. On the "healthy" western frontier, trails were studded with markers warning of cholera in infested waterholes and brackish streams, and few pioneers escaped a bout with the severe chills and fever of malaria, known as the ague. "He ain't sick—he only got the ague" was a common contemptuous remark.

The old-time doctor was most likely the product of one of the 460 private "medical schools" that were, in effect, diploma mills in which a student was required to attend two four- to six-month terms at $60 a term. In 1869 the dean of the Harvard medical school rejected a demand for written final exams with the comment, "A majority of the students cannot write well enough." Doctors were no more than venturesome prescribers of natural remedies; diagnosis was based totally on guesswork, and the unreliable therapy sometimes cured and often killed.

More a trade than a profession, medicine attracted mediocre get-rich-quick types, one of whom reportedly said, "Hell, if I hadda knowed a feller had to git up every night, I would never have started to learn doctoring." Surgeons were rated on their speed because most of them didn't believe in Lister's theories of sepsis. Even when anesthesia began to be used more widely, it proved to be a mixed blessing; with totally unconscious subjects to work on, surgeons became excessively daring and their expertise actually declined. President Garfield might have survived the bullet wound inflicted by his assassin, Guiteau, in 1881 if the "expert doctors" hadn't probed for the bullet with their fingers and unsterilized instruments.

Today's drug problem has its roots in the good old days. In 1868 there were

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an estimated 100,000 people hooked on opium alone. The Narcotics Drug Act of 1909 was far in the future, and any drug could be openly purchased in pharmacies by anyone, regardless of age. Over 75 percent of the drugs in a doctor's little black bag were addictive narcotics, and doctors abetted the problem by prescribing these drugs not only to satisfy the craving caused by their carelessness but also because they were the only things that could provide any relief from pain. Children were hooked early because few mothers were without such preparations as "Winslow's Baby Syrup" or "Kopp's Baby Friend," both of which were loaded with morphine. Apart from their narcotic content, many patent medicines contained as much as 40 percent ethanol.

We could go on and on—education (or the lack of it), crime, undernourishment, deficiency diseases (Do you know what scurvy is? Ever seen it?), lynch law, extreme racial prejudice, and no female suffrage (much less sexual equality).

Problems? Sure, we still have them. Things aren't perfect. But considering where we were a short time ago and how far we've come, things are getting better. We suffer from short memories, that's all.

Good old days? Go back? Not only no, but hell no! Forward with perspective, compassion, and technological know-how. ■

IN TIMES TO COME

Joseph H. Delaney emerged from the slush pile a couple of years ago and in that short time has become not only one of Analog's most prolific and popular contributors, but an almost-winner of both the John W. Campbell Award for Best New Writer and the Hugo for Best Novella. Despite all that, he's somehow managed *not* to have an Analog cover story yet, but next month we correct that omission with his lead novelette, "Chessmen." It's a story of humans in a defensive war against a uniquely nasty alien enemy, one of the major threats being a lack of detailed understanding of just who the enemy is and what makes him tick. It's also a tale of treason—or is it?

Perhaps it's appropriate that the fact article in the same issue is "Xenopsychology," the latest entry in the ongoing series of xenobiological speculations by Dr. Robert A. Freitas, Jr. This one, as the title suggests, explores some of the forms alien mentalities might take—to the extent that a human mentality can imagine them!

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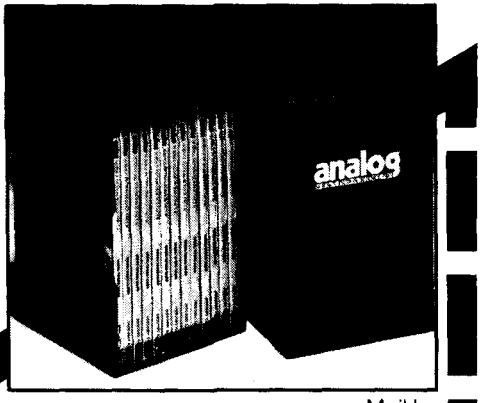

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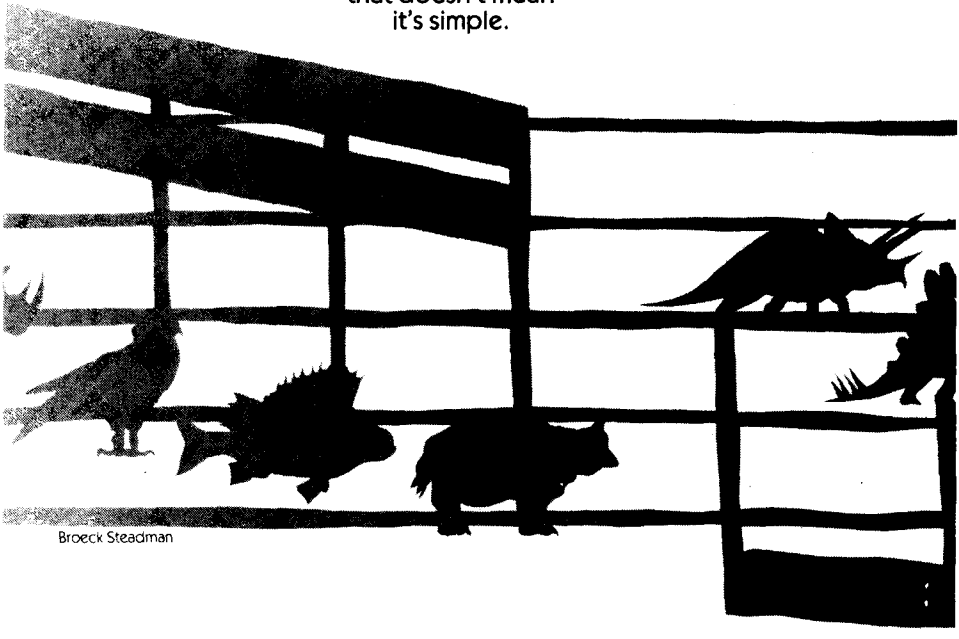
SYMPHONY FOR A LOST TRAVELER

Lee Killough

Few things are more important to an artist than artistic integrity—but that doesn't mean it's simple.



Broeck Steadman

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They walked in a moving band of light, into and out of darkness. The floor and ceiling panels of the corridor brightened as Cimela and the butler—in formal black-and-silver jumpsuit—entered each new section; glowing milky white, then dimming out behind them. The passage bored straight through the moon's rock. A glassy sheen of fused stone reflected back at Cimela between the succession of contemporary and classic paintings decorating the walls: abstracts by Tanguy, a Bosch, Seth Koerner's bleak planetscapes, and starships and aliens signed *Herring* and *Whelan*.

Cimela frowned. Kerel Mattias Ashendene's artistic taste ran to the fantastic. Why, then, had he sent expensive shuttle and Moon rocket tickets along with the enigmatic invitation to his lunar retreat—*I would like to discuss the creation of a truly unique symphony*—to a composer whose work celebrated nature?

She wished she had been able to learn more about the man than public facts: that his Interstellar Mining and Drilling, Inc. issued franchises to more than half the independent miners in the asteroids and Jupiter and Saturn's moons, that he owned controlling interests in numerous other corporations, including those manufacturing pharmaceuticals and computers and contragrav units. Journalist friends could supply only two pieces of tape on him, both eleven years old. One recorded his removal from the twisted wreckage of his sailcar and the other his departure from the hospital months later in a floatchair.

The butler clapped his hands. A section of wall opened to reveal an elevator. "Ask for level four, madam. Mr. Ashendene is waiting."

He was sending her alone into the lion's den? Cimela reflected wryly.

Near-normal gravity returned briefly, but faded again when the car stopped rising. The doors opened.

Cimela gasped in horror. Before her lay the open surface of the Moon, the side and bottom of a crater dropping away in a sharp pattern of light and shadow!

For a moment she did not see the distorted smear of her reflection on the inside of a transparent surface . . . the bittersweet of her jumpsuit a flame beneath her mahogany face and the ebony velvet of her close-cropped hair. Then breath returned in a gasp of relief. A dome! Even so, stepping out of the elevator, she felt for the polyplastic to reassure herself.

"You're quite safe," a deep, resonant voice said.

She turned toward the sound and found herself in a large, circular room. An assortment of tables and chairs floated above the glowing floor along with a bed, a computer station, and a desk piled with papers and minidisk files. Cimela barely noticed the furnishings. Above the waist-high cabinets and bookcases around the edge—filled with genuine printed and bound volumes—the dome and wire lattice generating its meteor screen rose invisibly, creating the illusion that nothing separated the room from the lunar crater. Earth hung overhead, a brilliant sapphire suspended against midnight velvet studded with diamonds. With difficulty, she dragged

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her eyes from the view to the man gliding toward her in a floatchair.

He extended a hand. "I've been looking forward to meeting you."

"And I you." His hand crushed hers. Eyes the color of moondust slid over her, assessing, dissecting. Where in them, and in the assured voice, craggy features, gray-touched hair, and iridescent jumpsuit was the person who bought those paintings? "Tell me about your proposal."

"Will you join me for tea?" He used the controls on one sweeping armrest to back his chair toward a table floating above the glowing floor.

Cimela accepted the cup he handed her and folded into a freeform chair. Suddenly, from somewhere, music flooded the dome. She instantly recognized her *Requiem For a Vanishing World*, even without the holo track. It flowed around her, stately bass notes representing whales booming along under the high music of birds and the sinuous rhythms of predators, all intermixed with the sounds of the animals' own voices: twittering, whale songs, howls, snarls.

Ashendene's moondust eyes continued to search her. "I never would have thought one could make music using DNA as the score. Four notes sounds so limiting."

She quirked a brow. "Nature manages well enough with them." She expected some reply, but he only continued to stare at her. The scrutiny brought a rush of irritation. "Am I not what you expected?"

The moondust eyes flickered. "Oh, yes . . . black and all."

She started. Could the man read minds?

"I researched you, of course. Cimela Bediako, thirty-one years old, single, born in Ghana, bioengineer father, music training in Sidney, lead singer and song writer for the Neo-Renaissance band the Rococo Roos until you switched to symphonic music and presented *World Primeval* at the San Francisco Opera House five years ago. If I'm staring, it's in admiration of one not only supremely talented and beautiful, but a veritable Pied Piper as well."

Cimela blinked. "Pied Piper?"

Whale songs cried in counterpoint to the howl of wolves.

Ashendene said, "*World Primeval* generated a renewed interest in dinosaurs, I understand, and your wildlife symphonies have inspired a growing conservation movement."

"I hope so!" She glanced up at the luminous sapphire above them, so unflawed at this distance. "We're spreading out across the galaxy, but we're not leaving anything to come home to."

"Not quite across the galaxy. We haven't left the solar system yet."

Cimela shrugged. "Well, there's no practical star drive. Star ships would also take metals away, and we don't even know there's anywhere to go."

The moondust eyes flicked over her. "Those are just the excuses we've concocted for abandoning the stars . . . all invalid. We *do* have an efficient drive, and there's not only somewhere to go, but someone to meet."

Her breath stuck in her chest. "Someone . . ."

Ashendene leaned toward her. "Three years ago a miner I franchised found a

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derelict ship in the asteroids. It's three thousand years old."

Her throat went dry. "We've been in the asteroids for only a century."

"Yes." He sat back. "My scientists have taken the ship apart and learned the principles behind the drive. I want to put that drive in human ships now. That's why I asked you here. I plan to announce my plans at a dinner for potential investors and I want music to celebrate the occasion. In addition to keeping all rights to the music and being my guest while while you work, you will, of course, receive monetary remuneration."

He named a figure that any other time would have left Cimela dazzled, but now she could feel only the bitter stab of disappointment. Background music! *This* was his idea of a unique musical work? She stood. "No, thank you. I don't do commercials or waiting-room music."

The moondust eyes went chill as the crater outside. "Perhaps you would be polite enough to hear me out. The credit I spent bringing you here entitles me to at least that much of your time."

She sat down again, stiffly, on the edge of the chair.

Ashendene frowned. "I want very special music, a long piece to be performed *after* dinner by an orchestra, something arranged as only you can do it, on DNA. That ship wasn't empty, Ms. Bediako."

Searing hot and cold shot through Cimela like an electric charge. Every hair on her body raised. "You found . . . people?" she whispered.

"What remained of them. Now are you interested?"

His sarcasm went unnoticed over the crescendo of her heart. People. Aliens! Life different from any that had ever walked this world! How were they built? Did all life share the same nucleotides, or would their genetic matter sing a different song? And Ashendene offered her the chance to see first. Breathlessly, she asked, "When may I see a printout of the nucleotide sequence?"

A thin smile crossed his mouth. "Today. I'll have it brought to your room. There's a computer station and synthesizer already there for you, but if you need anything else, just ask for it. Albert will show you the way."

Her "room" consisted of a large suite, one entire wall of which had been built of the same polyplastic as the dome and looked out into the crater. Neither Earth nor Ashendene's study were visible from it; just moonscape, starkly lifeless in patterns of black and silver, with the crater ringwall rising jaggedly into the velvet-and-diamond canopy of sky.

Staring out, she caught a reflection of the room: the butler entering with an overall-clad young woman pushing a contra-gee cart piled with computer printout. Cimela lost all interest in the crater. Pulse leaping, she spun on the cart and fingered the printout in anticipation. "Did you bring holos of the aliens, too?"

The young woman shook her head. "They didn't give me any."

Cimela frowned. She needed them to pick appropriate instruments and tempi, and to build the holo track. She would have to ask Ashendene for them.

The butler and technician set the

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printout on the floor while Cimela unpacked her electronic keyboard. After the door slid closed behind them, she arranged the paper in a circle on the carpet, creating her own ringwall. Then she sat cross-legged in the center, keyboard in her lap, and began reading through the nearest stack of printout.

Some corner of her mind remembered a servant serving supper, and that she flung herself on the bed for a while; but most of her awareness focused on the nucleotide sequences. She saw nothing else and heard only the music they made in her head and on the keyboard.

The computer had not printed out the chemical structure, either as formulas or zig-zag diagrams, but the terminology told her the aliens' "DNA" differed from humans': A′, G′, C′, and T′ where A, G, C, and T usually stood for the nucleotides, plus two more named PU-3 and PY-3, indicating an addition purine and pyrimidine. Six nucleotides! Their genetics must be very complex . . . but more than that, this time she had six notes to work with.

Except that a seventh, out of key, kept intruding. She tried to ignore it.

"Ms. Bediako!"

Cimela started with enough force to lift her off the carpet. Turning, she met the keen gaze of moondust eyes regarding her from the doorway.

Ashendene floated his chair into the room. "I came to check on you. Alfred said you didn't touch breakfast or lunch and wouldn't answer the door chime."

Meals? Door chime? Oh . . . the seventh note. She grimaced. "I should have warned you how engrossed I become when I work."

A brow quirked. "Indeed. However, I didn't bring you here to expire from anorexia. To reassure me of your nutrition, will you have dinner with me this evening?"

Dinner? That would mean losing two or three hours of working time. Still, it might also give her the chance to learn where the steely businessman became the lover of fantasy. "Thank you. What time and where?"

"I take my meals in my room normally. Alfred will be pouring the wine at nineteen hundred hours. It's a house vintage, from grapes in our hydroponics farm. I think you'll like it."

Spinning his chair, Ashendene sailed it out of the room. Only after the door had closed behind him did Cimela remember that she had forgotten to ask him for holos of the aliens. Shrugging, she returned to work.

By eighteen hundred hours she had decided on the length of the symphony, chosen the key, and decided that the notes from *Mi* up to *Do* would comprise her scale. She stood stiffly, stretching, ready for a break before looking for the strand sequences to harmonize with and make a counterpoint to the main sequence.

Ashendene greeted her with a nod of approval. "Lovely."

Cimela smiled. Though this was just a break in work, she had dressed carefully, choosing a gauzy gold jumpsuit with the voluminous sleeves and legs, snuggly cuffed at wrists and ankles, that the Moon's low gravity inspired in this year's fashions. Sitting down at the round library-type table where dinner had been set, she looked out at the crater and up to the luminous globe of Earth

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overhead. "Do you like this room best for its view of Earth or the moon?"

"The stars," Ashendene said.

The butler poured wine and served dinner, gliding over the glowing floor silent and efficient as a robot. Her *Kings of the Air* played softly around them, a chorus of strings singing the nucleotide sequences of the great raptors.

Ashendene asked, "How did you happen to begin using DNA as a score?"

Cimela sipped her wine. It was delicious, pale and lightly sweet as moonlight. "My father once gave my mother a birthday card that was a sheet of music with notes assigned to nucleotide sequences that resulted in the pigmentation of her hair, skin, and eyes. 'The song is you,' I remember him telling her. That fascinated me. I started playing with DNA tunes. Even the music I wrote for the Rococo Roos had DNA sequence themes, and later, when I began writing about life that had vanished or seemed about to, what better than to let the very substance of those animals plead for them? *World Primeval* sounds like any symphony, but even its themes are expanded from nucleotide sequences of the shark, lizard, echidna, and platypus."

Ashendene laughed. "I'm astonished how well it all sounds with such a restricted form, but even more amazed at the profound emotional effect your music has on people."

That always suprised her, too. "A friend once came up with a theory in an enebriated moment. He said the response results from resonance, a recognition on a deeply subconscious level of its similarity to the pattern of our own genetic structure. It's as good as any other explanation I've heard. I'll be interested in seeing how people react to an alien coding."

The moondust eyes flickered. "I would think they'd feel the same, given that the music uses human instrumentation."

She frowned. Human instrumentation. Could that be wrong? Perhaps aliens deserved new and more exotic sounds. She would play with the synthesizer. Which reminded her—knowing what they looked like would help her select appropriate sounds. "Mr. Ashendene, I need tapes or holos of the aliens."

He sipped his wine and grimaced. "There aren't any worth seeing."

She shrugged. "I don't care how poor they are; I need something for a basis of the visual track."

"The bodies were too badly damaged to tell much about their appearance. The 'DNA' has been read from a few cells that froze quickly enough to be thawed without destroying the internal structure."

"Even damaged bodies are worth something," she protested. "Are they large or small? How many limbs do they have? What's their clothing like? What about the ship?"

The moondust eyes stared into her, then went thoughtful. "I see what you mean. We have holos of the ship and you'll have them by morning. We're working on a computer reconstruction of the aliens based on a composite and skeletal structure and you'll have that too, as soon as it's finished. From what I saw, the aliens are a bit smaller than we are, covered with . . . bronze or gold feathers."

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Golden bird people? She grinned in delight. Perhaps flutes and strings, or chimes, should carry the musical theme. She played with the idea in her head the rest of dinner, and afterward programmed the synthesizer in her room for airy instrumental sounds.

Cimela kept working with the synthesizer, at the same time deciding on secondary and tertiary musical lines. During rests she studied the holos of the ship. It appeared strictly utilitarian, without decoration or color. Ceilings pressed low overhead, barely centimeters above the squatly arched doorways. The crew apparently never used furniture except tables and something like low blanket racks with padded bars. Water-filled mats on the floor served as beds. Beyond that the holos told her nothing about the aliens. She set them aside.

Every evening she ate with Ashendene in the domed study. The floor glowed beneath them; Earth shone overhead; moonwine filled their glasses like luminous silver. Ashendene entertained her with stories about his early days mining the asteroids.

"IMDI was just me, five buddies, and a patched junk ship in those days."

Cimela smiled at him over her wine glass. "You sound like you enjoyed it. Why did you give it up for a desk?"

He shrugged, looking past her at the sky. "The asteroids are just a way station."

After dinner they took tea in the study, or he showed her through another portion of the house. It had the facilities of a small colony: laboratories, workshops, staff apartments, and a hydroponics farm. Working on the ship here, no wonder he had been able to keep his find a secret. At some point they passed to a first-name basis, and one evening during her second week there she had the chance to learn about his love of fantastic art.

"I respect people who dream," he said, "even if it's nightmares, like Bosch. So few people dream these days. And speaking of dreaming, how is your work coming?"

The question had been inevitable. She sighed. "Slowly, as always. I'm still undecided about the lead instruments. Perhaps I'll use a recorder and samisen."

He blinked. "A what?"

"The samisen is a three-stringed Japanese guitar with a long neck. The recorder is a very old flute that's played like a clarinet. It went out of common use about the time of Bach, at least until the Neo-Renaissance movement revived interest in it. It has a lovely mellow sound."

A crease appeared between the moondust eyes. "Don't forget you're writing this for modern ears."

As though modern sound could not come out of old instruments. But that was what came of discussing instruments with a non-musician. "Of course. When do I need to be finished?"

"The dinner will wait for the music. Oh, I almost forgot. Albert." He beckoned to the butler. "Will you bring Cimela the envelope from my desk?"

Her heart went into fortissimo at the sight of the small, square gray envelope. "The alien construct program?"

Ashendene finished his wine. "Now

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you can start on the holo track, too, and stop being underworked."

She laughed at his teasing, but could hardly wait to finish eating. Ashendene appeared to read her mind. He said little the remainder of the meal and did not ask her to stay for tea afterward.

Back in her rooms, Cimela slipped the minidisc into her computer and waited curled cross-legged in her chair. The image appeared one line at a time, as though being sketched inside the screen. It pivoted at the same time, the far side of the three-dimensional shape remaining visible through the forming lines of the near side. With every turn, however, more details appeared —feathers, the facets of compound eyes, fingernails—followed by textures and finally by color, until the screen held a construction that did not look like a computer drawing but a holophoto of an actual being.

The alien stood on two muscular legs that bent strangely but carried him like coiled springs. He had no wings after all; small arms, also oddly jointed, folded across the golden chest, ending in hands with a thumb and two long, many-jointed fingers. Feather-fringed ears belled out from the sides of the broad head. Faceted opal eyes dreamed placidly above nasal slits and a smiling bow of mouth.

Cimela sighed in satisfaction. He was alien, yes, completely inhuman—she could not even identify the tools hanging on his belt—but utterly fascinating.

She plunged happily into her doubled task and over the next several weeks used the computer to create and store the thousands of images that would be projected as the visual track, while at the same time experimenting with countless nucleotide sequences played against each other in the voices of several dozen musical instruments . . . culling, choosing, refining choices. She lived, breathed, and dreamed the symphony, aware of little else. Even at dinner with Ashendene they spoke only of the work.

He did not appear to mind. He listened intently, and once Cimela looked up from the computer to find his chair in the doorway, his expression hungry. How long he had sat there Cimela could not begin to guess, and she eyed him, suddenly aware how isolated the house was, and that leaving would entail more effort than just hailing a cab, if she needed to escape unwanted attentions.

"Is that part of the final thing?" he asked.

She did not know whether to be relieved or disappointed. His passion was for the symphony, not her. "Do you like it?"

The hunger flared brighter in the moondust eyes. "It's even better than I dreamed. Have you titled it yet?"

"How about *The Lost Traveler*?"

"Perfect. Will you think I'm impatient if I ask how close you are to being finished?"

"Yes." But she smiled. "I'll answer, though. I'm almost finished. So plan your dinner and give me an orchestra for rehearsals. Do you really plan to bring an entire orchestra all the way from Earth?"

He smiled back. "No, just around the Moon. The Chinese have a very nice orchestra at the Celestial Village complex." His smile broadened. "Maybe the samisen is appropriate after all."

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* * *

Now work *really* began: printing out the score for each instrument, working with the butler to assign rooms to the several dozen musicians who flooded the house. Her days filled with hours of rehearsals, all held where the dinner and performance would be given: the ballroom, a dome like the study but many times larger. How she had missed seeing it before Cimela did not know, for it appeared to sit almost in the center of the crater, the rugged ringwall rising on all sides.

She had little time to admire the view, however. Though she spoke little Chinese and the conductor knew even less English, the two of them argued endlessly over tempi and other details.

Ashendene, attending one of the rounds, murmured, "Maybe we should have settled for a synthesizer."

Cimela shook her head. "I've been through this before. Wu Chien and I will work out our differences or I'll turn him into Peking duck."

Ashendene raised a skeptical brow, but by the day of the dinner she and the conductor were indeed bowing and smiling at one another. He shook his head. "Remarkable talent indeed."

The house filled to bursting. Each of the men and women Ashendene had invited moved in with companions and personal staff. They arrived a shuttleload at a time from the Americans' Port Heinlein for two days before the dinner, and though one or two did not arrive until the last moment, by seventeen hundred hours on the appointed day all were gathering in the ballroom for cocktails.

Ashendene hovered outside the elevator like a king on a throne, greeting his guests and introducing them to Cimela, who stood beside him in gold velvet.

The group had the glitter of an international opening night, the women wrapped in jewels and expensive fabrics, the men dressed in elegant formal versions of jumpsuits, kimonos, and dashikis . . . but it was neither that nor their names, most of which Cimela failed to recognize, that kept her heart in allegro tempo. The aura of power curled around them visibly. Without being told, Cimela knew that she shook hands with the men and women who really ran the world, and whose web of influence extended even out to the edge of the solar system.

The scene had the surrealism of one of Ashendene's paintings: the tables, impeccably set with the finest china, crystal, and sterling, arranged in a circle on the milky glow of the floor; and outside the circle the guests, milling together wearing their power as easily and elegantly as their formal clothing, chatting, seemingly unaware or uncaring that they did so in the center of a lunar crater. Light from hidden spotlights flooded the crater. No Earth or Sun shone in the sky, however. The jagged teeth of the ringwall framed a breathtaking vista of stars alone, infinitely vast and far, yet so brilliant that each distant sun—which one warmed the world of the golden-feathered people?—looked close enough for Cimela to reach up and pluck.

She sat at the head table beside Ashendene, completely unable to distinguish what she ate. Instead Cimela stared up at the glorious blaze overhead

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and wondered how the guests could ignore it for shop talk and gossip. "Don't they ever look up?" she whispered to Ashendene.

"Perhaps after tonight they will." Grasping the edge of the table, he pulled himself upright. "Ladies and gentlemen!" He waited while the roar of conversation died away. When only the occasional clink of a dessert spoon against glass remained, he went on. "I want to thank you all for coming."

As he spoke, Cimela noticed that a square in the center of the floor dropped and slid aside.

"I hope you've enjoyed the food and wine. In a few mintues the Celestial Village Symphony Orchestra will present the new work by Cimela Bediako that I promised you.

"Before that, however, let me relieve your curiosity about the business proposal I used to entice you here. In a word, I am offering you the stars."

Cimela saw several people start to frown, but before they could complete the expression the air swirled above the circle of tables. It solidified into a holo projection of the aliens' battered ship, a blunt cigar shape wrapped in a scaffold-like spiral. Brows arched around the tables, then dipped again speculatively as the guests recognized the strange craft's aged appearance. The eyes widened when Ashendene explained what the ship was and how and where it had been found. Then the ship dissolved and in its place a holo of the alien appeared, just as Cimela had first seen it: a pivoting outline, rapidly filling with detail, texture, and color. A sigh of indrawn breath swept the circle.

"We have learned to duplicate the drive," Ashendene said. "Star travel is now possible in flights of weeks and months instead of enduring for generations. All we need is a company to build the ships."

The physics behind the drive and the talk about bent space did not interest Cimela. The expressions around the tables did, and she bit her lip. She had seen closed faces like those before . . . on critics who decided even before the conductor raised his baton that her work could not possibly contain real artistic merit, only novelty, gimmickry. These people had no interest in investing money to build star ships.

". . . opportunity to establish trade," Ashendene was saying now. "If we'll use this drive, the universe and whatever profit may lie out there are ours. And now, refill your wine glasses and prepare for pleasure." The alien holo dissolved. "I present the Celestial Village Symphony Orchestra playing the most beautiful and talented Cimela Bediako's *The Lost Traveler*." He dropped back into his chair.

Sometime during his speech the orchestra had slipped into its place at the end of the room. Cimela laced her fingers tightly in her lap, her heart thundering like kettledrums, and nodded at Wu Chien.

After the first few bars, however, she forgot her nervousness, and even Ashendene and his guests. Nothing existed but the music. It soared, the main melody carried by a descant recorder, samisen, and harp. Other strings, the brass, and woodwinds sang behind them, playing complementary nucleotide sequences. And in the center of the tables the computer projected the visual track:

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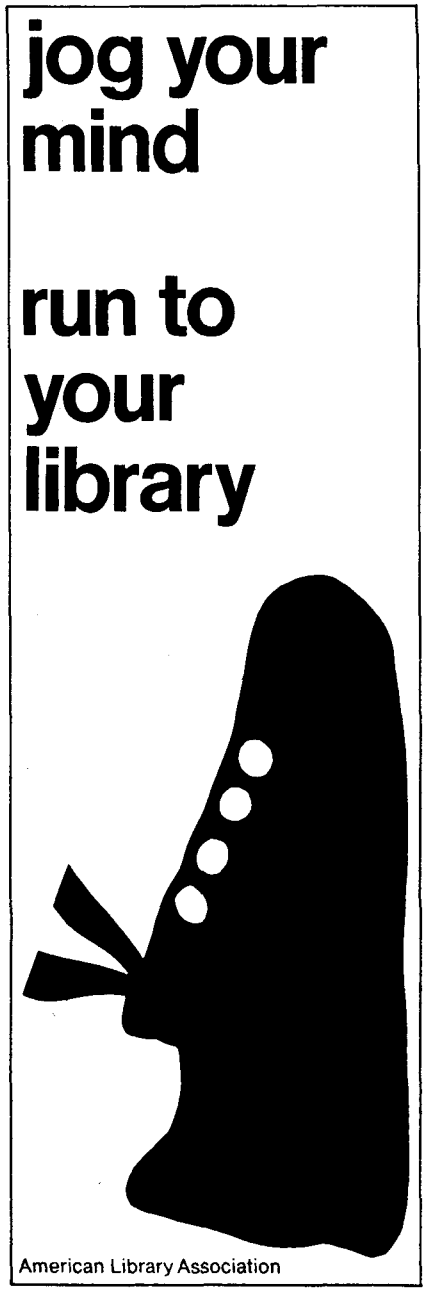
golden-feathered aliens with faceted opal eyes, stretching upward or striding along on their powerful legs, circling and embracing in a minuet-like dance, all against the backdrop of moonscape and starfields.

Cimela closed her eyes and let the sound possess her, reverberate through her bones and blood, hypnotic. How foolish people were to think that *they* created music, she mused. Nature did it first, and better, in the voices of wind and water and animals, and even in the very substance of what made all life what it was. The aliens might come from a different sun and a different sea, but in the very center of them their cells sang a song not that different from those of the trees, insects, and men of Earth.

When the music stopped, such absolute silence filled the dome that Cimela heard the sigh of breathing and the beat of her own heart. She opened her eyes hesitantly to find every guest sitting blinking at the empty air in the circle. She swung around to meet Wu Chien's eyes, stomach plunging. Oh, no! They hated it. She tried to look an apology at the orchestra.

But then the applause began . . . a single pair of hands, joined by another, then another, the sound swelling until the thunder of it shook the dome. Ashendene grinned and urged her onto her feet. And one by one the guests stood, too. The most powerful men and women in the solar system rose to their feet, their hands still pounding together in approval.

Cimela remembered bowing to the guests and orchestra, remembered the orchestra bowing; then everything blurred into a crowd of people surrounding her



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with congratulations. She floated on a cloud of euphoria that did not dissipate even when the ballroom emptied and she stood alone with Ashendene and a few servants.

She hugged him in sheer joy, throwing herself into his lap. "Kerel, thank you for giving me the chance to write this symphony."

"I thank *you* for *creating* it. Every one of them has asked to invest in the starship corporation." Then his arms tightened around her.

Somehow, without much surprise, she found herself in his private dome, in his bed; and the lovemaking made a celebration indeed, sweet and deeply satisfying as moonwine and her music together. Ashendene might be crippled, but not disabled, she discovered.

Some long time later she woke beneath the glorious blaze of stars and sat up in the bed, dreamily watching them. What happened next? Her contract with Ashendene gave her all rights to *Lost Traveler*, so she supposed she should take it back to Earth. After news of the alien ship spread, interest ought to run high.

She sat up more, smiling at the room, a place as surreal as the paintings: bookcases and the overburdened desk beneath stars and the lunar ringwall. She would miss the room, and probably Ashendene.

Cimela slid out of bed to pad naked along the bookcases, touching the antique objects and peering at their titles: fairy tales, science fiction, astrophysics, planetology, psychology. One book lay on the desk: another collection of fairy tales with a square of stiff paper marking "The Pied Piper of Hamlyn." Amused, she started to read the story, then noticed that the other side of the marker held a holophoto. But what *of*? She tilted it to the light of the floor, frowning. The thing looked like a misshapen porpoise. No . . . more like a giant slug, except that grey-green feathery-looking scales covered it and one end sprouted three tentacle limbs, two tipped in triple talons, the third ending in a cluster of smaller tentacles, and all situated around a great fang-filled maw. Eyes scattered back along the great body, faceted opals peering through the fronds.

Faceted opals? The hair raised on Cimela's back.

The book of fairy tales dropped forgotten to the desk as she pawed through the rest of the papers piled there. What she wanted lay under where the book had lain: more holos and a lengthy report. Cimela studied every holo and read the report, anger boiling up in her. That lying bastard!

"What are you doing, Cimela?"

She slapped the report down on the desk and whirled. "You lying son of a bitch! Golden-feathered aliens? The only similarity between the fraud and these holos is the eyes!"

He sat up. "Yes."

Her hands clenched to keep from spreading into claws. "You let me make *Lost Traveler* a fraud!"

Ashendene frowned. "Only the visuals are . . . inaccurate."

"*Only!*" He destroyed her artistic integrity and said *only*? "You—" No pejorative seemed vile enough to describe him. "Why did you do it!"

The moondust eyes regarded her solemnly. "Because I want man to go to

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the stars, and they won't if they think that the stars are inhabited by fanged slugs."

Angrily Cimela paced, flinging her head. "That's ridiculous. You lied about the age of the ship, too. That report says it's three *million* years old—and the aliens were chlorine breathers. They could be extinct by now, and even if they aren't, we don't have much chance of contacting or trading with them. It doesn't make any difference if they're out there."

He piled pillows up and leaned back against them. "Most people won't believe that. All they'll pay attention to is what they see—and you and I, of all people, know how much appearance influences what people think of something or someone."

Anger drained out of Cimela. She bit her lip. Oh yes, she knew. She sighed. "Why tell anyone about the aliens at all? Say *you* invented the drive."

His mouth twisted wryly. "Do you really think just having a drive will rekindle the star dream? No, they'll still talk about wilderness and lack of cost effectiveness. Some explorers go into wilderness just because they want to know what's there, but most people need a reason: population pressure, military advantages, trade. Greed is most effective, I think. Promise of profit will goad people into going places they'd never dream of otherwise."

Cimela sat down on the foot of the bed and hugged her knees. "So you invented attractive aliens and used me to dangle a trade carrot in front of your guests," she said bitterly.

"I had no other choice."

"You might have told me what you were trying to do. You could have asked me to help."

"After you parroted the words of every stay-at-home who's scoffed at my dream of the stars?"

That stung, but she saw his point. "What happens when they learn the truth?"

To her surprise he grinned, shrugging. "It may not be. That's a big galaxy; no one will expect to find our feathered visitors right away. Even if the truth does eventually leak, we'll be out there; and once people go into wilderness they usually stay."

The man was incorrigible, totally without conscience. In disbelief, she said, "You'd really base a star culture on a lie?"

He looked up at the blaze above them. "If that's what it takes. Babies don't remain in the womb forever. We're crippling mankind's growth by clinging to Earth and the Sun." His gaze dropped to meet hers. "Think of the possibilities. The trip doesn't have to be one-way. *I* can even go, and not have to be content with going by proxy. Think of what we can find. Wouldn't you like to visit a new world and play the music in the cells of the life there?" ■

● It isn't what people think that is important, but the reason they think what they think.

Eugene Ionesco

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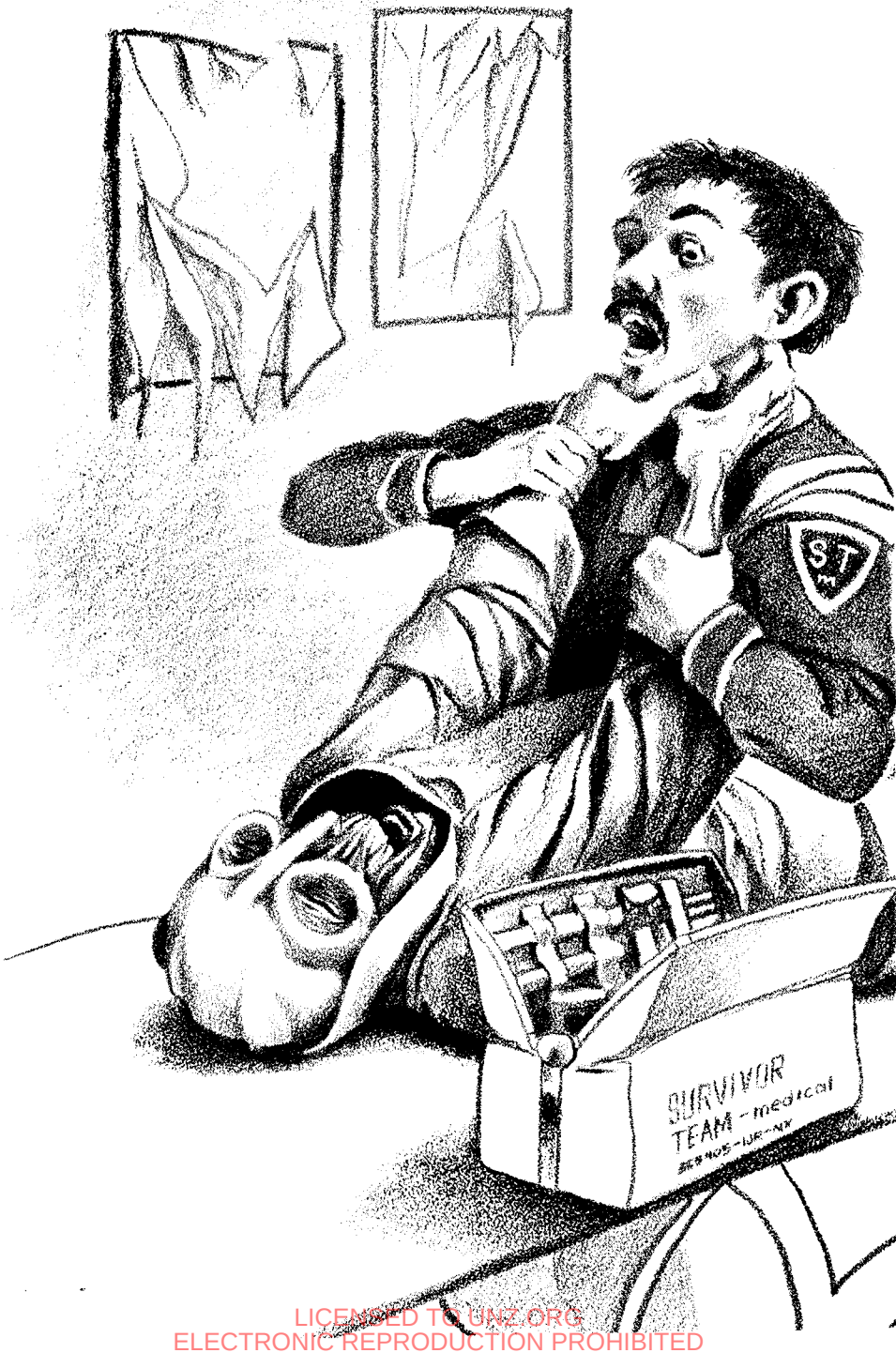

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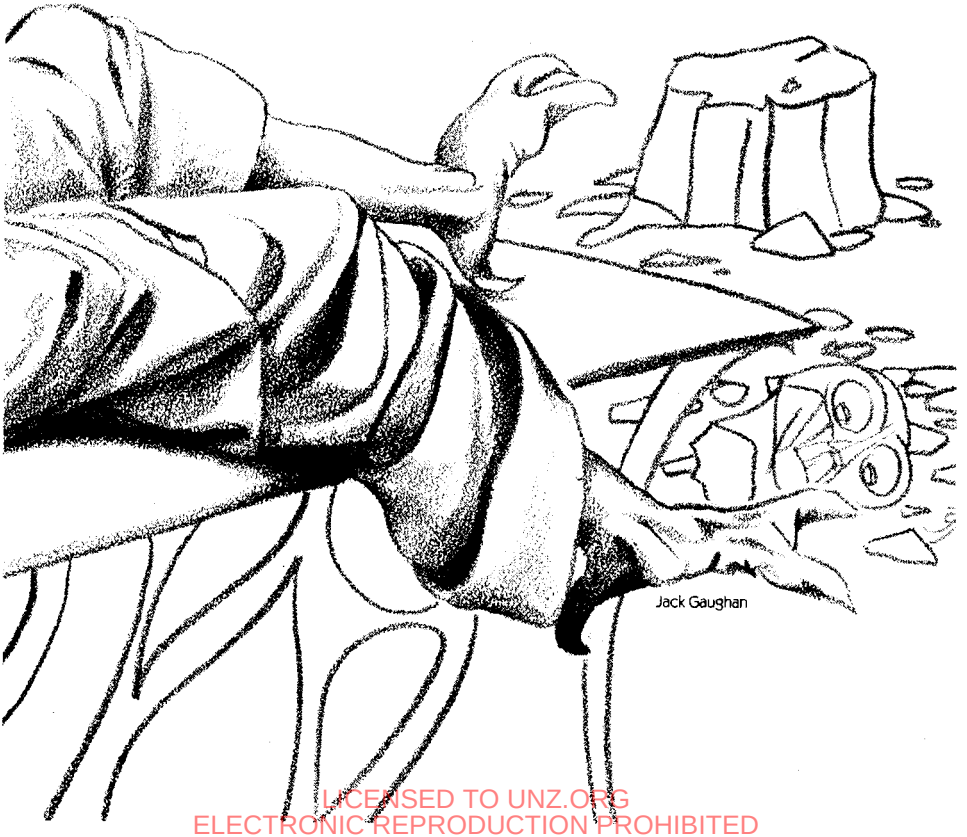
THE SAMARITAN RULE

Laurence M. Janifer

Some things seem Simple and Obvious and Universal—until you try to apply them to a really novel situation.



Jack Gaughan

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"The Law," this Freiburg said, "isn't especially gentle, Knave, and it certainly isn't kind."

"Well," I said, trying not to sound impatient, "it isn't meant to be."

Usually, when people start talking about Nouns like that, I make some small excuse, on the order of: "Pardon me, I have to go now, my hair is on fire," and I get the hell out of earshot. But this Freiburg type looked even younger and more innocent than he possibly could have been, and he was the sort of kid I tend to feel sorry for. I own and maintain a number of bad habits, but feeling sorry for the Freiburgs of this universe is one of my very worst.

He was buying me a lunch expensive enough to qualify the restaurant we were in as a planetary bank of issue, and extensive enough to qualify us both for any handy society of gourmets—but I don't think that had much to do with my restraint. Talk about Nouns, after all, can ruin even the most beautifully created feast.

Feeling sorry for Freiburg, and for me, I only sighed, and went on: "Law is just the rules of the game. And all the rules have to be is clear and complete —while providing fitting penalties for breakage. Kindness has nothing to do with that."

"But it isn't a game," he said, and sighed back at me, and took a small dig at his *ortolans à la Carême*. I took five or six somewhat larger digs at mine and wondered, with the back of my mind, whether the place had actually arranged for shipments of fresh birds via space-four, at truly staggering expense, or whether they'd worked out a way to breed the little things right there on Kingsley.

Having come to no decision—my mouth full and my mind very nearly empty—I said: "All right: it isn't a game. But whatever it is—whatever people do—there have to be rules. The law is the set of rules. Why assume it ought to be kind or gentle? Most rules aren't."

"But surely," Freiburg said, "we've progressed a *little*, over the centuries?"

The answer to that one depends. We've expanded into a Comity of Planets, plus a large bag of Frontier Worlds and longer-settled Independents like Kingsley, all tied loosely into one government. We have sublight ships that make all the local stops inside a solar system, so to speak, and space-four jobbies that cover the express jumps in ship-times (and universe-times, plus or minus a few picoseconds) ranging from three hours to three weeks. We have Totums, and Robbies slaved to them, to do the work nobody much wants to do; we have all sorts of maniacal technology; and six or seven of us have even learned to brew decent coffee.

None of which, of course, was what Freiburg had meant. Using his measuring-stick—moral and ethical behavior, with maybe a little artistic appreciation thrown in—we haven't progressed worth a damn. For some reason this fact depressed him; as I say, he was young and innocent. I'm not. Any day on which I wake up to discover that the entire human race has *not* regressed right on back to ritual cannibalism, plus the casual bashing-in of any available head that happens to irritate you, feels

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like a pretty good day. It may all be a question of expectations.

It may also be a question of experience. I shrugged, cleaning up my plate and looking properly doubtful.

"But so much of our law comes *directly* from past ages!" He put down his eating-tackle and looked at me earnestly. "Not just pre-Comity, pre-Space—I mean all the way back to 15th-century England—or 1st-century Rome. Or even further back. The sort of rigid, merciless requirements—" He sighed again. "That's why I left law school, you know," he said. "In fact, Knave, it's why I hunted you up, when I heard you were on-planet. I want to train to be a Survivor."

Oh, God.

A live waiter, coming round to shuffle our plates away, gave me a few seconds to devote to serious thought. I'd met Freiburg during a previous stopover on Kingsley, when I'd run into some types who had ambitions regarding a fair piece of his fortune, via a small adaptation of the Alien Clone con. I'd disengaged them with very little effort, and in the ensuing celebrations I'd mentioned my profession to the happy young billionaire. His reward had enabled me to hang up on official calls for planet-testing—which is a Survivor's primary business, no matter what the 3V adventure stories tell you—for better than a year, at the very top of my most cheerful standard of living.

Billionaires can make good lawyers—given a sufficient itch for Service, which this Freiburg seemed to have. They will never make good Survivors: they're not jumpy enough, and they've had too many things done for them. Dropped on a new planet with only the basic tapes on the place and your kitbag of standard equipment, your jumpiness, plus your total lack of any desire to tap somebody else, for anything —because there isn't going to *be* anybody else—is absolutely vital.

I spoke slowly and carefully. "Frankly, I'm not sure that would be such a very good—"

"I have to, Knave," he said. "Survivors do good. They *contribute* —they—well, they help the human race. They help every race of beings. But lawyers . . ." His expression said that his opinion of lawyers was six levels lower even than mine.

The waiter came back, with a something-or-other *flambé*. He let us appreciate it for a few seconds, during which a small idea nibbled at me.

"Tell me," I said when he'd put the Thing out and retired, "just what happened to start you thinking this way? There must have been something—an incident, a discovery—"

The Thing *flambé* had good rum in it, and raspberries. I took a spoonful, and then another, watching him riffle through his mind.

"Have you ever heard of the Samaritan Rule?" he said at last.

I've had bits of a fine Classical education, and a few shreds remain. I recited doggerel. "*Thou shalt not kill, but needst not strive/Officiously to keep alive*. Something like that. Villon, or Shakespeare, or the *Kalevala*. One of the Western Classics, anyhow."

"Close," he said. "Actually, I have no idea who wrote it—it's an ancient law-students' verse. Not quite the Rule, but in that area. If a doctor, say—"

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He stopped and shut his eyes. He was being a lawyer. No lawyer can explain anything, ever, without at least one long pause, and one very earnest caution that he's oversimplifying—in a real case, everything might be entirely different.

I was short on room, but I packed in three or four more loads of Thing *flambé* while I waited. Then his eyes opened.

"Now, this is a general rule," he said earnestly. "When it comes up —anywhere—it might be applied in some other way. And I'm making it very simple." So much for ritual. "But it's like this: If a doctor, say, is walking down a street, and sees a person hurt, or even dying—he has no obligation whatever—no *legal* obligation, I mean—to offer help. But if he *does* offer help, and his help doesn't follow ordinary medical practice—then he can be sued, by his patient, or the patient's relatives."

My idea had borne enough fruit, thank God, for a whole new *flambé*. "Wait a minute," I said. "He has to cure his patient, or get sued?"

"It isn't that bad," Freiburg said. "He has to follow accepted medical practice. Then, whether he does any good or not, he's in the clear. But if he tries anything new, he can be in bad trouble. And the worst part is—*he can walk right on by*. He never has to stop at all. Never."

"And that," I said, "strikes you as rigid, cruel, and heartless?"

"Well?" he said. "Isn't it?"

"That," I said, "depends," and the waiter came by with cheese and coffee. I took a sip. Perfectly adequate coffee, which is a good deal better than you have any right to expect, anywhere or at any price. "Tell me," I went on, "have you ever heard of Wankor? Or the Hundred-percent Plague?"

"Wankor?" he said. "Plague?"

"It's public knowledge—why not?" I said. "But the public doesn't much want to know. I was part of the Team that got involved—just about my first assignment. And it's quite a story."

"Knave," he said, "you can't brush me off by changing the subject—"

"I'm not," I said. "But you have to hear it all before you understand. Just sit back and listen for a bit."

He got settled. I sat back and shut my own eyes. It's not what you'd call a pleasant story. Not at all.

Wankor's density is near Earth's, but the planet is only about three-fifths standard size, which gives you that cheerful low-gravity feeling until it dawns on you that a lot of the more vicious predators get around by a combination of leaping and sailplaning—like flying squirrels, but with the teeth, size, and casual ferocity of the average jaguar—so your own added leaping power gets cancelled out. A big moon and a nice heavy atmosphere—just like home, wherever that happens to be—except for the damned predators, sailing along with no trouble at all.

It wasn't a pure Survivor situation: Wankor had an intelligent race. In fact, they'd discovered sublight travel some generations before, and had stumbled across the Vibich only a few standard years before our Survey Ships pinpointed the world and a Team was sent out—partly contact work, trying for friendly relations, and partly triple-red-signal emergency aid.

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The Vibich had been their bad luck. God knows they haven't been bad luck for us, nor any sort of luck at all; races own different sets of motives, and whatever the Vibich use involves their wandering around our galaxy, looking at all sorts of things but never stopping either to colonize or to make friends. Or, for that matter, enemies. They don't seem to land on planets owning intelligent life, and they didn't land on Wankor.

A Vibich threesome—the triplet of ships they always seem to use—had set down on an oxygen planet for repairs, and a Wankor exploration ship happened by, saw the landing from flyby, and messaged the ships. They got a return of their signals, which they took for *Received and acknowledged, but not understood*, and landed nearby. Four Pirrs went out in suits to make closer contact. (As near as we know, that's what they called themselves, just as Wankor is as near as we get to their name for their home world.) The Vibich hadn't seemed inimical, and the atmosphere read out fine, but they hung on to a little protection, just in case.

They made contact on neutral ground, between the ships. They drew some diagrams and made some sounds. The Vibich let all this happen. They managed to exchange the fact that both races used spoken language.

According to Pirr logs and medical reports, they exchanged a little more. The Vibich wear no suits; and the Pirr suits weren't made really tight. Apparently, the Pirrs depended on a well-known fact: it is next-door to impossible to catch a disease of any kind from an alien race. Too many basic differences. Too many coincidences have to fall in.

Human beings test every new contact with great care. The Pirrs had begun to depend on the odds—which work out at a good deal better than a million to one, but are no comfort at all if you turn out to be the one.

The disease, unfortunately, had a nice long incubation period. The ship had plenty of time to get back to Wankor—almost a standard year—before its crew started keeling over.

And then everybody started keeling over.

By the time we arrived, Wankor was one enormous Terminal Ward.

Human beings are apparently immune to the Vibich, and to the Pirrs as well—otherwise, add a whole new set of coincidences to the pile already at work. We could try to help out. So—we learned what we could, and we worked to help the Pirrs, and we called back for a lot more help.

You have no idea how big a planet is. No idea at all. Look: if everyone in a single, medium-sized human city—say three million people—fell suddenly and terminally ill . . . how big a hospital would you need? How many doctors and nurses and orderlies? How much in the way of medicine and water and food and bandages?

Think about it for a minute.

And then try to figure out how many cities of that size it would take to populate Earth. Wankor was settled almost as densely.

What we needed was three full planets' worth of aid, of every sort. What we had was one Team—six human beings, learning as we worked. It figured out to nearly three billion patients per human being.

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Of course, help was on the way—a sizable shipment for rush-emergency support: maybe a hundred people. That would reduce the load to somewhere near *one hundred and fifty million patients* for each one of us.

The death rate was reducing our load much faster than we could.

And there was nothing we could do to stop it.

And we didn't stop it.

I am not going to tell you about it in detail. It happened a long time ago, and we did everything we could, and seven or eight things that were flatly impossible, and we went on trying. You got so your heart broke twenty times a day—the Pirrs were so damned gallant and so damned stubborn, and one by one you were there as their limbs relaxed and their eyes shuttered closed. After the first week we knew there was no hope, and we went on working. Quitting was the only thing more painful than what we did.

The Pirrs, of course, knew the score as well as we did. There had been enough time to figure things out, to know that the plague that had hit them had been a million-to-one galactic accident, and to realize that there could be no acquired immunity and wasn't going to be any sort of immunity at all. They never blamed the Vibich. It wasn't in their nature, or their code, or their law, to blame the Vibich. And they knew we were trying to help.

When they really began to know that, we started taking precautions.

We were being shot at. Traps were being laid for us. One group of Pirrs, just well enough to manage it, constructed a sizable bomb and damn near set it off under our landing-ship.

And we lost one Team member, a competent gal named Shai Verent. A Pirr she thought was comatose made one last effort and stabbed her through the throat. We lost six of the hundred in emergency support—every one killed by a dying Pirr.

And the fires began.

The Pirrs made no secret of what they were trying to do. It took us a while to find out simply because we had only a little language in common, and no time to acquire more. What we did have, we'd got through necessity and accident, and whether the whole race used one language like the Comity, or seventy-six like the enclaves on Rasmussen, I have no idea.

They were destroying their culture.

It's an ancient truism that, given printing and mass distribution, you can't wipe out every copy of any given work. The Clean Slate War should have wiped that one out, along with the works it did manage to erase; but people still drag it out and display it for you, just as if it meant something.

The Pirrs had progressed as far as microfiche and central library call, which made things easier for them. No book existed in six million copies, not even best-sellers (if they had best-sellers): a few central libraries could display enough copies on home screens, page by page, to blanket the world.

A few editions of new books may have been printed for the people who just like the physical feel of a book in their hands; some printed books were around from the old days. But, if you could get to a few central libraries, you

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could do almost all of your job very handily; the written, or printed, word just ceased to exist.

Pictures and sculptures and the like were tougher to manage. The Pirrs did try to get rid of all those, too, but they were almost as devoted to such things as human beings are, and no fax reproduction is quite the same as the original—and there were millions of originals, covering all their recorded history. What we know about the Pirrs we know, mostly, because of the pictures and sculptures, and because of the bits and pieces our Team was able to bring back.

And, of course, because of a few accidents. A book survived, here and there. Few of them seem helpful.

We tried to explain to them that we were not enemies. We found out very quickly that they understood that. There had been enough time to spread the word about the cause of the plague. They weren't destroying their whole history out of some vague revengeful feeling that, at least, the Vibich wouldn't get hold of it. They bore no grudge for the many-millions-to-one shot that had come off.

Shai Verent—the gal who got stabbed—got the answer at about the same time as I did. She was recording, of course. The whole Team was using throat-mikes hooked to continuous-recording setups in our orbiting home ship, which is standard for Team work as long as there's a ship overhead. Shai's discovery was being dictated while I was talking with a Pirr who seemed to be a Respected Elder, as nearly as we could judge age among the race, or respect. He was alone in one hell of a large house, and very ill, and he was occupied with trying to burn a houseful of paintings, and smash a few sculptures, when I happened in.

There was not much we could do on Wankor, from beginning to end. There are basic support measures for any mammalian oxygen-breathing race, and the Pirrs were mammals. But the word is "support": we could make their last days and hours easier, and that was about it. Trying to give any sort of specific medicine to a strange race, suffering from a disease neither they nor human beings knew a single thing about, is a moron's form of gambling. One Team member, a born idiot named Ferenc Goss, did start giving out medication on a pure-chance basis: his notion was that, my God, it couldn't hurt, and who knew? It might help.

Which sounded as if it made sense. But he killed three out of five Pirrs. The course of the disease was fairly constant, and in those three it never had a chance: they took their medicine and keeled over inside of ninety minutes. Goss became the only human being to wait out the plague inside the home ship, in orbit. We sent him up in the landing-ship, and remoted the lander on back.

The two Pirrs he didn't kill died anyhow. One of them died of the plague, as far as we could tell. The other seems to have died of a combination of plague and medication.

Given all this, I had no hope for the old Pirr I'd come upon. The most I could do was to make him comfortable; but I was willing to do that. He took what I gave him, calmly enough. By then I had a few words of his language. It shocks the Hell out of me, when I think

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about it now, to remember that he had a good many words of mine. My guess is that the Respected Elder, at the very least, deserved the respect.

We managed to talk after a fashion. Smoothed out a little:

"You should rest," I said.

I'd wrestled him to bed by then, away from the few things he hadn't already destroyed.

"I must complete this," he told me. His voice was very hoarse. All Pirr voices were hoarse. Whether they'd been hoarse before the disease, we simply don't know.

"This? The destruction?"

"Nothing can be left," he said. "Nothing. Soon we will have rest enough—all of us. My work must come first now."

I'd asked him for his name, and he'd refused to give it to me. That was standard, too. They had names. They never told us one of them. I said: "Sir—some may survive."

"Some survive any illness," he said. "But not this. It is alien: we can have no defense. We can have no survivors."

"But—"

"We will pass," he said. "We understand that. Therefore, all must be destroyed."

I said: "Why?"

He said: "Would you have us left open to you? Open to strangers?"

He died during the night. I went on working—easing things for the few I could reach, for the little time we had. Watching the destruction. And beginning to understand what the old one had meant.

It was a matter of privacy.

Most races have some concept of privacy. And, for any such race, life is a war between the demands of privacy and the demands of contact with other members of the race. There are races that can reproduce themselves without direct contact. There are no races that can accumulate and pass on any sort of learning without it.

The way the privacy war is settled varies from one person to another, but it varies between fairly strict limits for a given race. Human beings, for instance, make a great deal of noise about privacy, but settle the war, generally, in favor of contact. The ease with which most people can slide out of a libel suit is one indication of that. The whole notion of public news, by 3V or fax or any other method, is a larger indication: in a more private world, news (if any) wouldn't have so many names attached.

We're tribal animals. Contact seems to be more necessary than privacy, for most of us, most of the time.

The Pirrs were a little different.

Take the libel law again. By our rules, libel dies with its object. If I make a large, public statement that someone—you, for instance—has poisoned six wives and is plotting treason in his spare time, I may get dragged into a court, and I might even be convicted, and have to pay money, or serve a term—or one each from both groups.

But if you die today, and I make the same statement tomorrow—I can't be arrested. You can't libel the dead.

For Pirrs, the rules were different. The law protected you, dead or alive.

Suppose I publish your private papers. Bingo: there I am, arrested again,

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and with a much better chance of getting convicted.

But if some archaeologist turns up Shakespeare's private papers—or the private papers of anybody far enough back so there are no heirs to profit from publication—the papers appear in print at once, and nobody even considers this fact odd.

For the Pirrs, privacy was a good deal more important. If a Pirr didn't destroy most of his papers before death, there were still rules about publication to protect him—rules that specified what could be published or even read, and were enforced just as strictly for papers two hours old, or a thousand years.

This slows down progress a little, maybe—but only a little. Most of the work that means progress is meant to be public. The rest is mostly gossip—which we love, and which seems to have been a damned severe crime, for Pirrs, even if the gossip dealt with their equivalent of Cro-Magnon Man.

More: for total strangers—for other races—*everything* was private.

Given a few hundred years more, that might have changed a bit. They'd only begun: we'll probably meet some other race the Pirrs made contact with, though we haven't yet. Enough contact might have loosened them up some.

As things were, though. . .

Well, when a Pirr died, he pulled the hole in after him. Posthumous gossip—in other words, ninety-five percent of any published Life of—didn't exist. Other material was left available for future Pirrs.

And when the entire race knew it was dying—

* * *

"Wait a minute," Freiburg said. "You mean—there's *nothing*—"

"A few paintings, a few sculptures. Some pages here and there, saved by pure accident. Two hours and a couple of minutes of something the scholars call music—also saved through an accident. Nothing else. It's all gone."

A silence. "But they might have had—"

"They might have had anything," I said. "Things we need. Things we could use. New directions in any science. New sorts of medicine. Even an idea or two about ethics. Or theology. There isn't any limit."

He stared at me. (The waiters were staring, too. We'd been sitting there for a long while.) "It's—I can't imagine —the loss—"

"That's not the loss," I said. "The loss is *the race*. If you can't mourn for the Pirrs themselves, then mourn for this: we've learned something new from every new race we've ever met. Because races are as different as people are. It isn't the new facts or notions we need most; it's the new way of being. What would the Pirrs have meant to us?" He was still staring. "We're never going to know," I said.

After a while—a long while—he said: "But the Samaritan Rule—"

"Right," I said. "Now: there are human beings, not many but some, who feel about privacy the way the Pirrs did. We're a race with a lot of possible attitudes; the Pirrs seem to have had only the one. So—we were the good Samaritans, right? We stopped off to help. We did everything we could. We eased the

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pain and discomfort of as many Pirrs as we could."

"Right," he said. "And we helped. We did help. But—"

"The one thing that is absolutely certain," I said, "from everything we found out, and everything we've been able to find out since—there are even scholars who think we'll be able to read those pages we saved, some day—the one certain thing is that the Pirrs would much rather we *hadn't* stopped off."

He opened his mouth, shut it, and then opened it again to say: "But—"

"Some people will feel that way, too," I said. "Make your rule nice and kind—tell a Samaritan he absolutely has to stop and help—and, never mind any other complications, you guarantee that you'll be forcing some people to take something they truly do not want."

"But—the others—"

I sighed. "Nothing prevents a Samaritan from stopping," I said. "This way, both parties are free—nobody is forced to do something he doesn't want to do, to someone else who doesn't want it done."

After which, there was a flurry of words, and then another silence. And then Freiburg said: "But after all—he can be sued—"

"Sure," I said. "Improper treatment. And that makes sense, too."

"I don't see—" he said.

I got up. "Remember our born idiot?" I said. "Improper treatment. He killed three intelligent beings, and we stopped him. True, we didn't have him sued; maybe we should have." He got up and fished for check-paying cash. His expression was wondering what he'd have done if he'd been on the Team that hadn't managed to help Wankor. I didn't think he was going to ask me about Survivor training any more.

I gave him a reassuring sort of smile. I had to work at it. ■

● It was in neolithic times that man's mastery of the great arts of civilization—of pottery, weaving, agriculture and the domestication of animals—became firmly established. No one today would any longer think of attributing these enormous advances to the fortuitous accumulation of a series of chance discoveries or believe them to have been revealed by the passive perception of certain natural phenomena. Each of these techniques assumes centuries of active and methodical observation, of bold hypotheses tested by means of endlessly repeated experiments.

Claude Lévi-Strauss, *The Savage Mind*

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the reference library

By Tom Easton

The Armageddon Rag, George R. R. Martin, Poseidon (Simon & Schuster), $15.95, 352 pp.
Superluminal, Vonda N. McIntyre, Houghton Mifflin, $13.95, 298 pp.
Worlds Apart, Joe Haldeman, Viking, $14.95, ? pp.
The Celestial Steam Locomotive, Michael Coney, Houghton Mifflin, $14.95, 264 pp.
Unicorn Variations, Roger Zelazny, Timescape, $14.95, ? pp.
Golden Dream: A Fuzzy Odyssey, Ardath Mayhar, Ace, $2.95, 269 pp.
The Zen Gun, Barrington J. Bayley, DAW, $2.50, 159 pp.
A Rumor of Angels, M. Bradley Kellogg, Signet, $2.50, 278 pp.
Fritz Leiber, Tom Staicar, Ungar, $11.95 (hb), $6.95 (pb), 134 pp.

Trumpets! Fanfares! Here, says the puff sheet, is "one of those rare novels that acts almost as a rite of passage for an entire generation—it seems to sum up where we've been, who we are, and what choices lie before us. . . . it captures the period [of the '60s] and what came after better than any other novel has, and it also says a lot about what we've arrived at in the '80s. . . . [It uses] rock and roll music—the pied piper of the era—to fuel a dazzlingly eccentric thriller that resurrects all the idealism and madness, the exhilaration and horror of the '60s. And it's a rollicking good read."

Again the fanfares. The book is George R. R. Martin's latest, **The Armageddon Rag**, and if it isn't quite the paragon and masterpiece Poseidon Press's PR proclaims, it is nevertheless very good indeed. And it is not science fiction or fantasy, despite the vividly underplayed touch of satanism that lends the whole a fantastic flavor. It is mainstream, keyed to music fans and the survivors of the '60s, and I hereby predict that it will hit the bestseller lists.

The story begins when Sandy Blair,

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less-than-successful novelist living with a woman realtor with whom he does not quite mesh, once a writer for the underground *Hedgehog* (before it sold out and went slick), is assigned to write the story of a murder. The victim is Jamie Lynch, once the greedy, power-tripping promoter of the rock group Nazgûl. He was killed in his Maine hideaway, tied to his desk atop a Nazgûl poster, on the anniversary of Nazgûl's last concert ten years before, when the lead singer (Patrick Henry Hobbins, *aka* the Hobbit) was assassinated.

Sandy's investigation leads him to the other members of Nazgûl; to old friends, unhappy sell-outs, burn-outs, and make-dos; and to Edan Morse, who wants to get Nazgûl back together and use their music to restart the revolution. Morse is a mysterious figure, linked to the terrorist splinter groups of the old SDS, who believes he is buying the revolution, drop by drop, with his own blood. He denies having anything to do with Lynch's murder, but he has two henchmen, a ruthless giant and a lovely seducer, who . . . And he has a double for Hobbins.

It doesn't take long for Sandy to join the team as PR man. Nazgûl begins its comeback tour with mixed success and ominous portents. Sandy has nightmares, storm clouds gather, and the bloodbath seems imminent. The omens peak at the tour's end, and Martin ends his thriller with a most satisfying resolution.

I can show you the keys to the novel in two quotes:

"The best lack all conviction, while the worst are full of passionate intensity" (repeated often), and ". . . he stumbles through blind alleys and wicked streets that loop back upon themselves, until finally he emerges on the main thoroughfare again, the long straight avenue with its tall iron streetlamps haloed in the fog. But the street is empty now and he has lost all sense of direction and does not know where to go. He wanders to the middle of the street and stands there, baffled, helpless, looking first in one direction and then in the other, afraid to move, the blank gray walls of fog growing solid all around him. Around and around and around he turns, in dizzy circles." (p. 330)

The worst of the '60s *knew* what was right. They were the pigs in '68, the Weathermen, Daley and Nixon and the terrorists.

The best were confused, caught between the politicized, polarized, haloed armies, lost in the ideological fog. They bounced from side to side of the avenue and wound up in the middle of the road for lack of any clearer direction. They left the '60s trapped in indecision. They settled for life much as their parents lived it, but they were not satisfied.

Just so is Sandy Blair. Yet he demonstrates that there *is* a path out of the fog that owes nothing to Right or Left. He rejects the violent tactics of both, and he thus finds a kind of apotheosis.

Martin shows Sandy's progress most effectively. He thus offers hope to those of us who still suffer the confusion they bear from the '60s. That hope is Gandhian and Maslovian—nonviolence and self-realization—and it does indeed seem a likely root of peace and the Millennium.

And Martin *has* written a cracking good story.

For years now readers have been wanting more of what Vonda McIntyre offered in her story "Aztecs." Again and again they have been impressed by McIntyre's handling of feeling and her imaginative renderings of futures keyed to biology rather than physics or engi-

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neering. There has been *Dreamsnake*, and a collection, but no more "Aztecs."

Until now. Now we have **Superluminal**, the novel into which "Aztecs" has grown. McIntyre's Aztecs are starship pilots whose hearts have been replaced by pulseless machines. The reason is that normal, intact humans cannot perceive or stand exposure to the higher dimensions of the universe through which starships must find their faster-than-light (superluminal) paths. Locked to the sensorial universe by their biological rhythms, they cannot cope, and they die. After the surgery, and presumably other changes, they have conscious control of their innate rhythms and can survive.

There's a problem there, in that biological rhythms are not just a matter of pulse and breath. They are cellular, synchronized via hormones by one or more centers in the brain's hypothalamus. I doubt very much that they can be cancelled so neatly. If they could be, I would believe much more readily a bit of psychosurgery or a brain implant.

But let that be. Let McIntyre have her liberating technology, and look at what she does with it. Heroine Laenea has just undergone conversion to pilothood. She meets Radu Dracula, a colonist who has survived a plague and become a starship crew member, stashed in drugged sleep whenever the ship exceeds light speed. They love, and they discover the truth of the antipathy pilots have for normals: their systems resonate, making each other's presence intolerable. Normally, only pilots feel the antipathy and keep apart. But Radu has been peculiarly sensitized by plague and Laenea, and he feels an antipathy for pilots, despite his love.

Is *Superluminal* then merely a tale of star-crossed lovers? No. Laenea is lost on her training flight. Radu dreams of her and is convinced he can find her. He wakes in superluminal flight and is not destroyed. Pilots, threatened by his uniqueness, attack him. He finds refuge with Orca, a diver, a human genetically modified to be a cousin to cetaceans. He leads Orca and pilots to Laenea, displays a new talent, opens the universe, and runs, scared of pilot greed and jealousy. Yet for all the hullabaloo, his destiny lies elsewhere. His and Laenea's paths have parted, and he has discovered the divers and their cousins. The next stage of his life will be in the sea.

The ending seems an awkward departure from the thread of the story, but it is the sort of thing real people do, and McIntyre's people are quirkily real. So is her world, with starports modeled on outsized offshore oil platforms and a U.S. still officially at war with the divers who have denied it whaling.

More unsatisfying is Radu's gift of a way to travel, instead of from star to star, all the way to the edge of the universe in one grand leap. McIntyre finds wonder and promise there, but I cannot help but see the ultimate nothingness beyond the edge as a brick wall precluding growth and advance. After *Superluminal*, McIntyre's world has nowhere left to go. Its future can be little more than the working out of details—and then stasis forevermore, at least on the interstellar level. She may yet prove me wrong, but I expect any sequel to this book will dwell far more on the world of divers. This may in fact be why McIntyre introduced the divers to the "Aztecs" world. Wonders loom in their lives, unpreempted by cosmology.

I cavil, but I enjoyed the book. McIntyre's characters live. Her vision enchants and intrigues. Her world beckons. Follow, and enjoy.

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Just over a year ago I reviewed Joe Haldeman's *Worlds* by saying, in effect, that Joe was rewriting early 20th-century history with LaGrangian-type habitats as the U.S. and Earth as Europe. In *Worlds* he had Marianne O'Hara take the Grand Tour, visiting Earth to complete her education, and escaping just as nuclear holocaust began.

The second volume of the trilogy is now out, as **Worlds Apart: A Novel of the Future**, and I can't be a whole lot kinder to it. Marianne is home, embarking on her career track even as her World, New New York, absorbs refugees from other Worlds destroyed in the war, and tackles the forbidding task of survival independent of Earth. Thinking her Earthside lover lost forever and probably dead, she takes a pair of husbands. But Jeff Hawkings lives, and he has become a Healer in a region dominated by Mansonites who treat death as a sacrament. He is also one of the few adults in a world of children, for the war brought a plague upon age. Jeff's continued existence gives Haldeman a focus for frequent glimpses of the post-holocaust Earth. Unfortunately, his obviously satirical social commentary gooses only outdated sacred cows.

As New New York swipes a shuttle from an African spaceport to forestall an H-bomb surprise, drops plague vaccine, and delivers tools and seeds to survivors trying to rebuild, Marianne is there. Hers are the eyes of America on a post-War (I or II) Europe, her hand the hand of aid, her voice a superior tone of, "Isn't it nice that we live so far away and are above all that?"

I'm snide, but Haldeman makes this tone too explicit for me to feel very guilty about it. When New New York builds a starship, many of its people —including Marianne and her husbands—leave for Epsilon Eridani, and Marianne says, "We have our own concerns."

Worlds Apart is better than *Worlds*. It may even portray a fairly likely future, for "they" do say that history repeats. But I found it superficial and glib, without depth, with too few novel insights into people, history, or the future. And I might never have noticed these lacks if the book—or Haldeman's past work—hadn't seemed to promise more. There is nothing whatsoever *wrong* with the novel of sheer entertainment, unless we expect something else.

I expect the third volume of the trilogy will show us Marianne at Epsilon, building a new world, for she expects to live that long. She will be an elder leader then, and the story's protagonist may well be her daughter, born after departure from New New York. Perhaps there will be glimpses of the scene on and around Earth as well. Perhaps there will even be glimpses of the originality Haldeman once showed.

Michael Coney has embarked on an ambitious project. "**The Celestial Steam Locomotive**," he says, "is the first of a two-part episode in a cycle of novels of similar background called the Song of Earth. The basic idea for the Song of Earth came to me three years ago when I found my science fiction was becoming restricted and parochial. I decided then to start writing a type of science fiction which would logically embrace all times, past and future, all places on Earth or elsewhere, and all alternative worlds. I also decided to get away from other peoples' [sic] jargon: multidimensional space, alternative timestreams, possible futures: and use my own words: Greataway, happentracks, Ifalong. . . . At the same time I wanted to start inventing again; unu-

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sual humans, creatures, worlds and situations, without degenerating into fantasy . . . —even a steam-hauled railway train which flies through space."

His new jargon guarantees a certain freshness of flavor, and it works, too. But it is more than that that makes *Locomotive* worth a look. The story takes place some 150,000 years from now (more or less), when humans have split into several species: True and Wild and Quicklies, and the Specialists, who are actually humanized beasts. Most True Humans sleep in the Domes, inhabiting a Dream Earth, too fat and weak to survive in the thin air of the real world—in which is immanent a sort of ultimate computer, the planet's and humanity's memory, which sings the Song.

Starquin the Five-in-One, who may be God, is imprisoned in the space about Earth by hate bombs once sown by defensive humans. He wants out, and to gain His freedom He manipulates the lives of mere humans. Manuel, Wild Human from the coastal town of Pu'este, comes together with Zozula—a True Human caretaker of the Dreamers—and the girl without a name, a Dreamer removed from the Dream. Joined as the legendary Triad, they invade Dream Earth, ride the Celestial Steam Locomotive, and set right the malfunctioning Rainbow, the computer that runs the Domes and allows the Dreamers their Dreams. Thus they accomplish the first step toward Starquin's freedom.

What is the Celestial Steam Locomotive? Is it real? Does it work? I can hear you asking, and I can answer: It is a seventy-mile-long figment of the collective imagination of the Dreamers. It roams the Greataway, actually seeming able to escape the Dream, but it is a fragile thing, sustained by belief. Its engineer is Long John Silver, and its fireman the devil, and its passengers are not supposed to get off.

And there is more, much more. The book —and surely the full, multivolume Song—is packed with images and signs and symbols. Its flavor is that of song and of dream. Its scope and sweep are cosmic. It may gain a tremendous reputation, even akin to that of Peake or Wolfe or Tolkien. It may birth a campus cult.

Or it may fizzle completely. It may prove just too far removed from its readers. It may seem cute, or forced, or even juiceless. Its biggest problem is that it does avoid the imagery of life, the sweat and pain and desire, in favor of idealizations. It thus reminds of the courtly ballads of the Age of Chivalry, of Spenser's *Faerie Queene*, of antique versions of the Arthurian epic.

I leave it to you. Look a copy over, buy it, and make up your own minds.

David Hartwell, editor of Pocket Books' Timescape SF line, has consistently bought and published some of the best SF available. Roger Zelazny's **Unicorn Variations** is one of the last Timescape titles, Hartwell having left in connection with a controversial reorganization. It's a collection, notoriously difficult for a writer to sell and presumably difficult for a publisher to market. But it deserves buyers.

Go to it, gang. You know Zelazny. He's given us some marvelous novels. He has also written some very good shorter pieces. Twenty of them are here, including "Home is the Hangman," along with an introduction, notes on the stories' origins, and two essays on SF. The stories vary widely, from "Unicorn Variation" and its transformation of a chess match—between a hiker and a unicorn intent on supplanting humanity—into a think tank where the hiker

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and a handful of mythical beasts can devise solutions to ecological crises, to "Walpurgisnacht," wherein a graveyard comes alive with "artificial" intelligence, and "The George Business," an antic ode to cooperation. Typical of all is Zelazny's hard-edged reliance on the nifty conceit rather than deep thought or feeling, but many flash an "Aha!" or two on the reader. You won't miss your money.

And now for a few short takes: H. Beam Piper's Fuzzies are back, but not from him. The popularity of *Little Fuzzy* and *Fuzzy Sapiens*, in which human colonists discover cuddly little aliens and squabble over their sentience, prompted William Tuning's *Fuzzy Bones*, which gave them a history as the descendants of alien castaways. Now Ace has commissioned a fourth entry in the saga, **Golden Dream: A Fuzzy Odyssey**, from Ardath Mayhar (who is "very *fast* at writing, and . . . partly alien"). *Dream* tells the Fuzzy story from the Fuzzy point of view, from early days to the adoption of and by humans, and it does it fairly well, more or less successfully avoiding the hazards of insufferable cuteness. However, the book seems unlikely to appeal to anyone who does not already know and love the Fuzzies. Mayhar, perhaps because of her speed, did not get away from the childish tone of Fuzzy speech which Piper used to match their halting English. Mayhar's Fuzzies sound like nursery-school rejects even in their own tongue, which belies their high-tech, high-intelligence origins.

Barrington J. Bayley's **The Zen Gun** depicts a declining far-future Empire ruled by a few snotty humans and staffed by rebellious animals engineered to sentience. The more human outlying worlds, including Earth, are trying to assert their independence; but the Empire, its guns in the hands of pigs, has other ideas. Onto this stage steps the brutish Pout, made with genes from all the primates, and his stolen, thought-obeying gun. Pout knows nothing of the gun's true powers or its history—it was made by a Zen master to destroy suns—and he uses it to goose slaves.

Even from so little, you can see that *Gun* is a feast of invention, social comment, and satire. Right? But the invention is preposterous, the comment stale, and the satire boring. Give it a miss.

M. Bradley Kellogg's **A Rumor of Angels** is a much better buy. Here, Terrans have punched a hole through to an alternate world inhabited by friendly, but cautious natives. The natives confine the Terrans to a mountain-walled valley with a curtain of psi. A few stay on hand, posing as quaint primitives.

But the curtain is wearing thin, the Terrans are eager to export their urban mess to the pristine lands beyond the valley, and some natives are ready for a massacre. The resolution, in which a few Terrans redeem themselves and their species, satisfies. One of the book's best points is its depiction of how telepathy could make a government of consensus truly possible.

Tom Staicar's **Fritz Leiber** is a loving tribute to a master of SF, fantasy, and horror. It offers very little biography, concentrating instead on Leiber's works. In the process it summarizes, interprets in terms of the times when they were written and of Leiber's own life, and stresses Leiber's comments on life and the world. There is also a light stress on of Leiber's science-fictional predictions—he seems to have turned out right a surprising number of times. ■

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brass tacks

Dear SOBs:

Re: "We, the People," Mid-September 1983

I, like most regular *Analog* readers, devour your magazine in my "spare time"—in my case, commuting on the bus, and at lunch.

When you publish a story that, without warning or possibility of control, has a reader gushing great salt tears in a public place, the least you could do is provide a cautionary note.

I have sent a copy (fair use, I hope) to my congressional delegation and a mess of candidates, with a message. "Whatever needs to be done, *fix it so this can happen.*" If every reader who was moved would do the same, maybe, just maybe . . .

Dammit, I'm crying again! Thank you.

JUDITH BAKER HINE
Attorney at Law
Seattle, WA

Dear Mr. Schmidt:

How quickly facts catch up with fiction. On Thursday I got the September issue of *Analog* and read the story "The New Untouchables," wherein the pivotal notion is that there is a specific gene which renders certain individuals unable to comprehend or accept the moral consequences of their proposed actions. On Friday I got the issue for 16 July of *Science News*, and in the article called "Solving the Mystery of Anxiety," I read that "certain criminals" may be unable to generate specific substances necessary to produce feelings of guilt or anxiety. Speaking of a substance called gamma-aminobutyric acid, which has been shown to generate in humans feelings of extreme anxiety, one scientist says, "It is possible certain criminals have a defect in this anxiogenic

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mechanism . . . they may not be able to generate anxiety or guilt." Wow!

My own feeling is that "positives," as the New Untouchables are otherwise known in the story, should be like drunks as the ancient Romans saw them: far from their drunkenness being a mitigating circumstance, it was considered an exacerbating circumstance (*in vino veritas*). It's now known that there is a gene which causes certain individuals to metabolize alcohol differently from the way other people do . . . they really can drink you under the table. If such an individual *chooses* to get drunk and then commits a crime, is he then to be absolved of guilt? Seems to me the ancient Romans had the right idea, to wit, that drunkenness made crimes that much worse. Should a crime committed by an individual genetically unable to generate feelings of anxiety or guilt go unpunished? Ideally, the law in our society applies equally to all, but what a frightening thought it is that some people might be exonerated from crimes because of a genetic condition! Still, the story's a pretty good one so far, and I did chuckle at the slant on judges, lawyers and the court system. . . .

DON P. SAVELL

Catonsville, MD

Dear Mr. Schmidt:

In response to M. David Stone's excellent article "Search for Terrestrial Intelligence" (July), I would like to report the happy fact that Nim, mentioned on page 61, is alive and well at the Black Beauty Ranch just north of Athens, Texas.

He was rescued from certain death through the efforts of Jerry Owens and the Fund for Animals. He now resides in a specially built home that is spacious and comfortable.

As his personal physician, I can attest to his good health and improved mental outlook. No matter what anyone says, Nim is "people" and should be treated as such.

JAMES S. COX, M.D.

Dear Stan:

It's been a long time since I've read anything as beautiful as Don Sakers's "The Leaves of October," in the August 1983 issue of *Analog*. Such beauty is hard to come by in today's mainstream of "kill or be killed" stories, whether science fiction or not. And such beautiful writing shows what true good—in comparison to bloodthirsty evil—is transplanted in the minds of the human race that always keeps the best of us hopefully attuned to the Universal Song.

Yes, the author brought out his point nice and sweet, to this reader, at least. It's something the good and bad people of all ages should read, and makes us wonder more about the wild things growing around us. The leaves of October are always beautiful in a way, and according to this beautiful writer, the human race is always worth saving!

JAMES W. AYERS

Attalla, AL

Dear Stan,

I enjoyed your editorial ("Thought by Proxy," September), as usual. I agree with the main thrust entirely. But I would like to give a stronger defense of a number of scientists' "aberrations," and particularly of Einstein's with respect to quantum mechanics. (I know that you didn't treat it as one, but I know many who do.)

While Einstein did, in an emotional outburst or two (and it's clear that that's what it was, from the recorded context), sweepingly denounce the new quantum theory, he also presented, on many oc-

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casions, his well-reasoned objections to the *philosophical underpinning* that the new quantum theorists were attaching to their observations and generalizations. His argument was not with the observations or the validity of the mathematics—he stated this clearly; it was an argument in the domain of the *philosophy* of science, which, for Einstein, was an aspect of the philosophy of life within which he did everything that he did. My own reading of Einstein makes me think that it would be entirely possible to agree with his objections to the "Copenhagen interpretation" *and* do research based on the new quantum theory—the same research done by those who embrace the now-orthodox interpretation. Einstein's decision to stop working on the development of a quantum theory was a decision of conscience, not science: he felt very strongly that it was a bad idea to adopt the philosophy that was becoming dominant in the field. To understand why, one would have to become familiar with (and sympathetic with, I believe) the vision(s) that guided Einstein's life in science, religion, politics, and other matters. One will not find a quirky blindness, or a quirky vision, behind his stubbornness; I find his attitude entirely consonant with the rest of his work, and very well argued—not in his oft-quoted few dramatic outbursts (who is at his best when he's upset or angry?), but in his many more carefully reasoned discourses on the matter. In my opinion, Einstein's argument, seen in the field of ontology, was considerably superior to (more firmly grounded and carefully reasoned than) that of his opponents. That it required of him that he spend his time on other things may remind us that he, like any of us, had to decide what to do not only on the basis of what he knew and could do but also on the basis of what spoke itself as right to him.

I would suggest, then, that one not ask, "How could such a smart person have been so wrong?" I would begin with, "What did he say?" He didn't say that the new quantum theory wouldn't succeed, in the sense in which we know that it did succeed. He said rather that asking those questions would, in the long run, deceive us. "How?" By taking as a base what his philosophy told him must be a superstructure. He advocated a different direction of investigation, to probe for a different base. "Was his argument coherent and reasonable?" I believe that it was coherent and reasonable enough that it has not yet been refuted. "Was he right?" I don't know; I don't know that I ever will know. He argued for taking a course that was not taken; who can say what would have happened had he succeeded in persuading his colleagues to take quantum mechanics in that other direction? Or what will happen now that he didn't? (I have heard it argued, incidentally, that Newton's concept of force delayed the development of Lagrangian mechanics, and so has had a long-lasting deleterious effect on physics. I have also heard it forgotten that Ptolemy developed a system that was, and is, pretty good at predicting positions of planets.) Hindsight, even in the light of predictive success (or failure), may or may not ever be adequate to answer the question, "Was he right?"

Just a couple more comments on other items in the editorial.

Concerning Dr. Hyman's conclusions: I disagree about what is a "trap" for a mind. Venturing outside one's area of solid expertise, under the name "curiosity," is at the base of all science, and is hardly a trap. Forgetting one's ignorance *is* a trap, and it can cause one

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to relax methodological discipline, and to speak too soon. Which relates to "working secretly": embryos didn't develop well in public; one may do a disservice to all by offering his work to public scrutiny prematurely.

And finally: Bluebirds turning into blue whales doesn't really seem wilder to me than, say, tiny whirligigs turning into maple trees.

DENNIS SCHMIDT

Columbus, OH

Dear Editor,

I was profoundly irritated by Rick Norwood's August letter of despair (over not being able to teach most students how to solve math word problems). His glib equation of word-problem proficiency with reality-problem proficiency is based on some sweeping assumptions, the most glaring of which is that math proficiency and intelligence go hand in hand. I'm as left-brain dominant as Mr. Norwood, I dare say, and rather good at reality-problem solving, thank you, but math has been my *bête noire* for as long as I can remember.

RAND LEE

3 Higgs Lane
Key West, FL 33040

Mr. Norwood replies:

I was not despairing. I was pointing out a problem. The word problem problem applies to people who can do math but who can't solve problems. You can solve problems but can't do (or don't like) math. Math phobia is caused by math teachers who are afraid of math, and we have math teachers who are afraid of math because we have a school system that lets mathematicians go and leaves the teaching of math courses to education majors. But that's another problem.

Dear Dr. Schmidt:

John Q. Coston (Brass Tacks, September 1983) invites the "space enthusiasts out there . . . to put some Bucks into some programs that you might not live long enough to enjoy." Well, a lot of us are doing just that: the Space Studies Institute (P.O. Box 82, Princeton NJ 08540) has existed since 1977 "to conduct and support leading-edge research essential to opening the resources of space for human benefit within this century." (Quoted from an SSI brochure.) Some of us, the Senior Associates of the Institute, have pledged to contribute at least one hundred dollars per year for at least five years. Contributions from the public are the Institute's main source of support for a program that includes the design and construction of prototype Mass Drivers and the investigation of techniques for processing of lunar materials to produce pure metals and other substances.

Recently, professor O'Neill has been doing design studies on a satellite-based system for air traffic control, called Triad, and has formed a company named Geostar, Inc. to turn his patent into a working system. If commercially successful, Geostar could generate substantial revenue to support other commercial activities in space. However, even without dividends from Geostar, SSI hopes to complete its five-year research program by 1987, publish the results, and encourage some other private organization to exploit them commercially in large-scale space industries.

ROD MONTGOMERY

Princton,NJ ■

● For every vision there is an equal and opposite revision. Kelvin Throop III

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a calendar of analog upcoming events

17–19 February
BOSKONE XXI (New England-area SF conference) at the Boston Park Plaza, Boston, Mass. Guest of Honor—Gene Wolfe: Official Artist—Vincent Di Fate; Special Guest—David G. Hartwell. All the usual plus more. Registration—$20 at the door. Info: Boskone XXI, NESFA Inc., Box G, MIT Branch PO, Cambridge MA 02139.

17–19 February
CLIPPERCON (media-oriented SF conference) at the Hunt Valley Inn, Cockeysville, Md. Guests of Honor—Nichelle Nichols, Allen Asherman, Howard Weinstein. Registration $25, banquet $20. Charity auction, etc. Info: ClipperCon, c/o Marion McChesney, 3429 Chestnut Avenue, Baltimore MD 21211.

24–26 February
WISCON at the Inn on the Park, Madison, Wis. Guests of Honor—Jessica Amanda Salmonson and Elizabeth A. Lynn. The usual plus "Women Warriors in Art and History." Registration—$16 at the door, $5 supporting at all times. Info: SF3, Box 1624, Madison WI 53701–1624. 608–251–6226 (days) and 608–233–0326 (evenings).

27 Feb–1 March
Compcon Spring 84: "Intellectual Leverage—The Driving Technologies" at San Francisco, Calif. Info: John Wakerly, Computer Systems Lab, Stanford University, Stanford CA 94305. 415–856–0169.

2–4 March
UPPERSOUTHCLAVE XIV (Upper-South SF relaxacon) at Park Mammoth Resort, Park City, Ky. Guest of Honor—Mike Lalor. Registration—$7 until 14 February, $9 thereafter. Info: ConCave, P.O. Box 116, Park City KY 42160.

12–16 March
International Conference on Robotics at Atlanta, Ga. Info: Robotics, P.O. Box 639, Silver Spring MD 20901. 301–589–8142.

16–18 March
LUNACON (NYC-area SF conference) at Sheraton Heights Hotel, Hasbrouck Heights, N.J. Guest of Honor—Terry Carr; Artist Guest of Honor—Tom Kidd; Fan Guest of Honor—Cy Chauvin. Registration—$16 in advance, $19 at the door. Info: Lunacon, P.O. Box 779, Brooklyn NY 11230.

19–21 March
Third Annual Phoenix Conference on Computers and Communications at Phoenix, Ariz. Info: Susan C. Brewer, Honeywell, LCPD, MS/Z22, P.O. Box 8000 F, Phoenix AZ 85066.

22–25 March
SWANNCON 5 (International Conference on the Fantastic in the Arts) at Boca Raton, Fla. Guest of Honor—Stephen King. Writers' and teachers' workshops, readings, etc. Info: Conference on the Fantastic, College of Humanities, Florida Atlantic University, Boca Raton FL 33431.

30 August–3 September
LA CON II (42nd World Science Fiction Convention) at Anaheim Convention Center, Los Angeles, Calif. Guest of Honor—Gordon R. Dickson; Fan Guest of Honor—Dick Eney; TMs—Robert Bloch & Jerry Pournelle. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition, the works. Join now and get to nominate and vote for the Hugo awards and the John W. Campbell Award for Best New Writer. Info: LA Con II, Box 8442, Van Nuys CA 91409.

—Anthony Lewis

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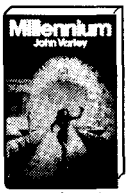

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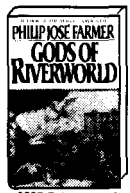

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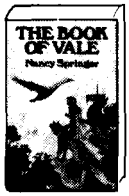

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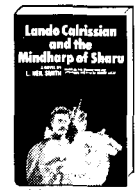

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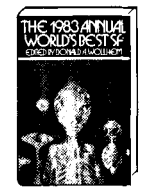

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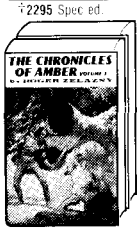

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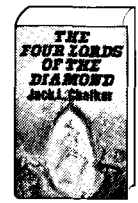

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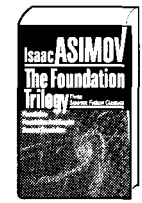

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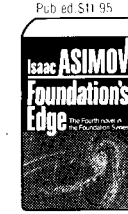

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